Firms Rush Abroad to Build

s markets, favorable taxes, low costs
$1¾ billion overseas—more to follow . . Page 33

rs Streamline Production

ater 6000 gph of sticky solids
628 sq ft of filter area . . . . . Page 49

CHEMICAL PROCESSING

PROCESS DYNAMICS

CHEMICAL BUSINESS

NOVEMBER 1960

akthrough
at Cyanamid . . .

Specially trained task force gets down to 'rock bottom' fundamentals in production analysis of operating plants . . . savings already make skeptics blink—and it's only the beginning . . . . . Page 29

PROCESS DYNAMICS PAY-OFF

A PUTMAN PUBLICATION
"Executive Magazines for Industry"

$1.00 the copy

. . . for interest in these 12 interesting new compounds from B&A®

Sulfur Tetrafluoride-Boron Fluoride Complex. ($SF_4 \cdot BF_3$)
N, N-Dimethyl Sulfamyl Chloride. [$(CH_3)_2NSO_2Cl$]
Sodium-2-Chloroethane Sulfonate. ($ClCH_2CH_2SO_3Na$)
Hydroxylamine-O-Sulfonic Acid. (H_2NOSO_3H)
Duroyl Propionic Acid. ($C_{10}H_{13}COCH_2CH_2COOH$)
2, 2-Dichlorobicyclo- (4,1,0) Heptane. ($C_7H_{10}Cl_2$)
2-Methylmercaptophenol. ($CH_3SC_6H_4OH$)
4-Methylmercaptophenol. ($CH_3SC_6H_4OH$)
Sulfamide. ($NH_2SO_2NH_2$)
Sulfuryl Fluoride. (SO_2F_2)
Sulfur Trioxide-Pyridine Complex. ($SO_3 \cdot$ Pyridine)
Methylene Sulfate. $(CH_2SO_4)_2$

Frankly, as yet we know very little about the uses for these new chemicals. We do have limited technical data on each which we'll be glad to send you. We can also provide small laboratory quantities of most of them for your investigation.

All of these new compounds have been prepared on a laboratory scale as a direct result of General Chemical's broad research programs. They are not now available in commercial quantities, but we could supply such quantities if enough demand develops.

Would you like to join our "fishing expedition"? If so, just attach the coupon to your card or company letterhead.

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

BAKER & ADAMSON® Fine Chemicals

Baker & Adamson Products CP-110
GENERAL CHEMICAL DIVISION
Allied Chemical Corporation
40 Rector Street, New York 6, N.Y.

Please send data on the following compounds:

_____
_____
_____
_____
_____

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State____

Check 1000 opposite last page.

that's interesting

Chemical outmelts salt

Harmless snow white pellets have 30 times the thawing capacity of salt at 0°F, according to the manufacturer, Revere Chemical Corporation, Cleveland, Ohio.

Chemical generates extreme heat immediately on contact with moisture, yet is harmless to grass, shrubs and other vegetation, if used as directed.

Ozone analyzer designed to probe weather secrets

Some more of nature's weather secrets may be revealed by an instrument designed to analyze the layer of ozone in the stratosphere.

The ozone layer, located in the atmosphere between 40,000 and 150,000', absorbs ultraviolet radiation from the sun. This and the accompanying processes of ozone formation and decomposition heat a layer in the stratosphere causing turbulence.

The turbulence, extending to the mesosphere, and resulting air currents, are suspected of affecting atmosphere circulation.

Mounted on a jet tanker, the ozone analyzer will measure heat given off by the decomposition process and this information will be used to determine extent of ozone and variations with seasons.

Analyzer was developed by Armour Research Foundation, Illinois Institute of Technology, for Air Force Research Division, Geophysics Research Directorate.

THAT'S INTERESTING

Uranium surplus

Demands for uranium to fuel nuclear power generating stations won't catch up with current U.S. capacity until the late 1980's, according to economists at Arthur D. Little, Inc.

Drug curbs hypertension

A single daily dose of guanethidine sulfate being marketed by Ciba Pharmaceutical Products, Inc., as Ismelin, promises to control even more severe forms of high blood pressure.

It prevents release of norepinephrine at junction of nerve terminals and blood vessels. Norepinephrine, required by the body for maintenance of normal blood pressure, is sometimes found in excessive quantities. When this happens, blood pressure becomes elevated.

For more information on product at right, specify 1001 see information request blank opposite last page.

There's a MARK-20 in your future

One MARK-20 shipper is saving $1400 a trip! And this is only the savings on freight rates. Handling and paperwork costs are also slashed when you ship 20,000 gallons in *one* car.

Savings like these are why there's a MARK-20 in your future if you're interested in cutting distribution costs.

The MARK-20 is the most modern and efficient tank car on the rails. And you don't invest a cent of capital to get these cars in your full-time service. We'll supply them tailormade to your specifications...coiled, insulated or compartmentalized. Why not let us apply our logistics experience to your bulk liquid shipping and storage problems. Write or call NORTH AMERICAN CAR CORPORATION, 231 South LaSalle Street, Chicago 4, FInancial 6-0400.

IF IT'S NEW IT'S

NORTH AMERICAN

CHEMICAL PROCESSING
CHEMICAL BUSINESS

HIGHLIGHTS

NOVEMBER 1960

VOLUME 23 • NUMBER 11

THIS MONTH'S COVER

New approaches to production problems and solutions based on statistical planning and computer-aided calculation are taught to special teams at American Cyanamid. Lessons learned in the first class (1958) paid off so handsomely in practice that a second class was conducted this year. Thus, the pace is being set for a new era in process study and design (page 29).

Special This Month

29 Process improvement via Process Dynamics
American Cyanamid uses specialists, 'live' plant studies to reduce costs, up capacity

33 U.S. firms rush to build chemical plants abroad
Favorable taxes, access to materials, low costs among incentives behind $1¾ billion invested

38 Contract maintenance—skill as you need it!
Fact that size of crew can be keyed to needs helps boom use of CM in process industries

40 Imports squeeze organic chemical makers
Tariff picture clouded as industry struggles for government recognition of its problems

49 Filters save space, streamline production
Self-cleaning units dewater 6000 gph sticky solids through only 628 sq ft filter area

66 Propylene imine offers new vistas to chemist
Specialty organic potential being explored as compound becomes available commercially

INDEX

29 Chemical Business
66 Chemical Materials
9 Chem-Trends
20 Conventions & Exhibits
148 Corrosion Control
185 Current Literature
91 Ideas
14 Letters from Readers
133 Material Handling & Packaging
49 New Solutions of Processing Problems
8 Our Growing Industry
162 Plant Engineering, Maintenance & Safety
103 Process Instrumentation & Laboratory Apparatus
118 Processing Equipment
22 Recent Books
17 Spotlight on People
26 Watching Washington
199 Advertisers Index

Other Features

43 How creativity is sparked in industrial research

46 Teaching operators 'whys' of job spurs interest

54 Phosphate dust nuisance checkmated by scrubber

72 Di-peroxide derivatives go farther as catalysts

91 Continuous mixer KO's Polaris fuel bottleneck

103 Hitch-free coolant flow via automatic distribution

108 IR sample drying gives two batch/day bonus

118 Synthetic filter fabric facts you should know

124 Pill powder sifter offers dust-free particle control

133 Bagger booms output of NH_4NO_3; saves $5000/yr

136 Starch shuttled to 7 mills by pneumatic trailer

148 Epoxy coating repels acid fumes, salt air, humidity

162 Liquids-handling system helps up coating capacity

174 Ball valves keep rolling as design variety grows

over the editor's shoulder

Just how 'free' is your enterprise?

A good many business organizations do not practice on their employees the philosophies of free enterprise and individualism which they so earnestly preach when complaining of excessive Government intervention. They are often guilty of forcing their people into a stereotyped mold for the sake of "efficiency." Lost in the shuffle of over-organization is that necessary ingredient of any successful venture—creativity.

There is, of course, more to the creative process than establishing ideal environmental conditions. (The broader aspects of the problem, insofar as they apply to research, are the subject of a series of articles on "Creativity and Survival" which began in our October issue on p. 25; also see p. 43 in this issue.) But, without the proper atmosphere, this creative process will never even get off the ground.

Companies must come to realize and act upon the axiom that original concepts always are a function of the individual spirit — meeting and conquering a problem in the hidden arena of his own mind. This is not an argument for elimination of all restraint; chaos is as debilating to creativity as is over-organization.

Maintaining a creative-oriented organization provides the toughest sort of challenge for top management. (Of course, management must always beware of the non-industrious shirker who attempts to disguise his lack of productivity under a cloak of pseudo-creativity.) Great as it is, this challenge must be met. If it is not, the driving force of the American economic juggernaut will eventually drown in a sea of red tape.

George Bangs

Assistant Editor

NO "NEW IMAGE" FOR US, THANKS

Seems nowadays practically everyone talks about "changing the image," "creating a new corporate image" or "giving the product a more dynamic image."

There's no such talk around Jenkins Bros.

When it comes to valves, we're as modern as tomorrow! But when it comes to a new corporate image, no thanks. Not for us. Our corporate image is nearly 100 years old, and it still suits us just fine. Here's why:

We'll Keep our Old, 1869-Model "Image" – Our Business Friends Seem to Like It

"A Fair Offer" was first published in 1869. Simple and forthright, it said that Jenkins Bros. wanted Jenkins Valves to be judged on performance. But — and this made the difference — not on performance in the average application, but rather in the very toughest one. Note that phrase, "the worst place you can find."

To us, it just naturally figures that the product which asks for the hardest job, will also be better, longer lasting and more trouble-free in regular, run-of-the-mill applications. Makes sense, doesn't it?

At intervals we republish "A Fair Offer" just because it does make sense to so many of our customers and friends. It's a useful reminder that products may change but *high standards* never go out of style.

JENKINS®

Jenkins Bros., 100 Park Avenue, New York 17

Jenkins Bros

A FAIR OFFER

If you will put a Jenkins Valve, recommended for your particular service, on the worst place you can find . . . where you cannot keep other valves tight — and if it is not perfectly tight or it does not hold steam, oil, acids, water or other fluids longer than any other valve, you may return it and your money will be refunded.

Jenkins Bros

This early Jenkins Catalog carried the famous A FAIR OFFER which has appeared in every catalog since 1869.

Check 1002 opposite last page.

15 SPECIFIC PACKINGS FOR ALL CORROSIVE SERVICES

White asbestos yarn impregnated with Teflon†.
White asbestos yarn externally lubricated with Teflon.
Teflon multi-filament yarn, no lubricant.
Teflon multi-filament yarn lubricated with Fluorolube.
Teflon multi-filament yarn lubricated with Teflon.
Shredded Teflon encased in cotton jacket.
Shredded Teflon encased in Teflon tape jacket.
AAAA asbestos yarn lubricated with Teflon.
Crocidolite blue asbestos yarn surface-lubricated with Teflon.
Crocidolite blue asbestos yarn lubricated throughout with Teflon.
Teflon tape, no lubricant.
Teflon tape impregnated with chemically resistant lubricant.
Teflon tape jacket over Crocidolite blue asbestos impregnated with chemically resistant lubricant.
Teflon tape impregnated with lubricant suitable for nitrating acid service.
Teflon tape lubricated with special non-hardening, non-melting lubricant.

John Crane CHEMLON *BRAIDED PACKINGS

Specific service conditions are always best handled with a packing designed for the purpose. This is especially true when it comes to the hard-to-handle liquids in the chemical, petrochemical and refinery industries.

For this reason John Crane has developed 15 individual field-proved types of Chemlon Braided Packings. Within this line there is a type and style that will meet any combination of service conditions and requirements.

1. All known industrial acids, alkalis or solvents.
2. Temperatures from −120°F to +600°F.
3. High or low shaft speeds, also valve stems.
4. Longer packing life due to lower coefficient of friction and non-raveling construction.

Send in your service condition and we will recommend a Chemlon Braided Packing best suited to your application. Request Bulletin P-325.

Crane Packing Co., 6421 Oakton St., Morton Grove, Ill. (Chicago Suburb).
In Canada: Crane Packing Co., Ltd., Hamilton, Ont.

†*T. M. for DuPont Teflon* **T. M. for the Best in DuPont Teflon*

John Crane MECHANICAL PACKINGS SHAFT SEALS TEFLON PRODUCTS LAPPING MACHINES THREAD COMPOUNDS

CRANE PACKING COMPANY

Check 1003 opposite last page.

CHEMICAL PROCESSING
CHEMICAL BUSINESS

with which is combined
PROCESS DYNAMICS
CHEMICAL PROCESSING PREVIEW
and CHEMICAL BUSINESS

November 1960
Volume 23 • Number 11

©Putman Publishing Company 1960

For the management team
More than 50,000 copies of this issue

Published Monthly by
PUTMAN PUBLISHING COMPANY
111 East Delaware Place
Chicago 11, Illinois
Telephone: WHitehall 4-6141

also publishers of FOOD PROCESSING, FOOD BUSINESS, QUEST . . . for tomorrow, What's NEW in CHEMICALS, What's NEW in plant-engineering EQUIPMENT

EDITORIAL STAFF

Editorial Director
Russell L. Putman

Editor
Chicago
John C. Vaaler

Executive Editor
Dana B. Berg

Editor
New York
John B. Mellecker

Associate Editor
Chemical Business
Gordon Weyermuller

Associate Editors
Ted F. Meinhold
Theodore W. Wett

Assistant Editors
George Bangs
Jay Gossett

Editor West
Karl Robe

Washington News
Joan Marziotti

Consulting Editor
D. S. Davis

Editorial Assistants
Helen Bautista
Chris Pancerz
Monica Mastin (New York City)
Betty J. Heaton
Arline Folaron

Art Director
Ralph C. Donges

Editorial Production
Joann Schmitt
Patricia Beswick

ADMINISTRATIVE STAFF

Russell L. Putman . . . . . *President and Publisher*
Ewing W. Graham . . . . . *Vice President and Treasurer*
George W. N. Riddle . . . . . *Vice President — Research*
Thomas J. Scanlon . . . . . *Director of Circulation*
Robert C. McKay . . . . . *Circulation Manager*
James C. Budd . . . . . *Production*

Advertising Representatives—page 201

Accepted as Controlled Circulation publication at Mendota, Illinois. Publication office: 111 E. Delaware Place, Chicago 11, Illinois. Address all correspondence to Editorial and Executive office, 111 East Delaware Place, Chicago 11, Illinois

Member
Business Publications Audit
of Circulation, Inc.

CHEMICAL PROCESSING serves members of the Management Team in these industries:

Basic Chemical and Chemical Processing Industries

Industrial inorganic & organic chemicals (acids, alkalis, plastics, synthetic fibers, explosives, etc.)
Drugs & medicines
Soap & cleansing products
Paints, varnishes, lacquers
Gum & wood chemicals (Naval stores)
Fertilizers
Animal & vegetable oils & fats
Miscellaneous chemicals (cosmetics & toiletries, inks, insecticides, water treatment chemicals, etc.)
Paper & allied products
Petroleum, coal, coke-oven products
Rubber products
Stone, clay & glass products
Atomic energy establishments

Other Industries Utilizing Chemicals or Chemical Processes

Food and allied products
Textile dyeing & finishing
Leather tanning & finishing
Metals & alloys
Machinery & equipment
Allied products (tobacco, photographic film, instruments, fabricated plastic products, etc.)
Water treating & purification plants
Government (including ordnance, missiles, etc.)

Specialized Services to the Chemical Processing Field

Plant construction consulting firms
Independent research & testing laboratories
Manufacturers of specialized chemical equipment

Subscriptions

QUALIFIED-READER SUBSCRIPTIONS are accepted from selected management and technical key men in the chemical industries without charge. To apply for a qualified-reader subscription fill in and mail the request-qualification form opposite last page.
OTHER SUBSCRIPTIONS — from "non-qualified" persons (those who are not key processing men in the chemical industries) — are accepted at $1.00 the copy, or $10.00 the year. Foreign subscriptions — subscriptions from countries outside the territory of the United States and its possessions — are acceptable at $35.00 per year. Such subscriptions are not counted as "industry circulation" on BPA audit reports.

THERE IS A DIFFERENCE IN PIPE FITTINGS

Speedline® FITTINGS ARE MADE TO MEET CRITICAL STANDARDS

Now you can comply with the severest codes and save up to 50% on *critical* stainless steel process lines when you specify SPEEDLINE Fittings and economical light wall Schedule 5 or 10 pipe.

The new issue of Code for Pressure Piping ASA B31.3-1959, for example, allows a *design pressure* of 611 psi for 2″ ips Schedule 5, Type 304L process pipe at 100°F. Under the same conditions, allowable design pressure for 1½″ ips pipe would be 768 psi; for 1″ ips, 1122 psi.

Since SPEEDLINE Fittings have been specially designed for use with light wall pipe, they can result in substantial installation economies whether you plan to butt-weld, flange or socket-join your lines. Yet *long tangent* SPEEDLINE Fittings cost no more than other fittings which are suitable for "non-critical" service only.

Let a SPEEDLINE Distributor show you why there *is* a difference with SPEEDLINE Fittings . . . and what that difference can mean at your plant. Complete Catalog on request.

For Distributor Listings see pages 1513 to 1516 Chemical Engineering Catalog. 1003

Speedline®

CORROSION-RESISTANT FITTINGS
STAINLESS STEEL • ALUMINUM • SPECIAL ALLOYS

A PRODUCT OF HORACE T. POTTS COMPANY • 502 E. ERIE AVENUE • PHILADELPHIA 34, PENNSYLVANIA

Check 1004 opposite last page.

Which valve alloy for your next job?

When you next have a requirement for high alloy valves, especially for corrosion service, why not come to the company with the most experience in this field.

Aloyco has specialized in the manufacture of stainless steel valves, exclusively, for over 30 years.

We have accumulated a wealth of know-how, not only on how to engineer valves for hard-to-handle corrosives, but also on what alloys are the most efficient and will give the longest life.

Aloyco's field consulting service is yours for the asking. Why not write or call our nearest sales office for help on your next alloy valve job. Alloy Steel Products Company, 1302 West Elizabeth Avenue, Linden, New Jersey. 9.10

Offices in: Boston • New York • Wilmington Atlanta • Buffalo • Pittsburgh • Chicago St. Louis • San Francisco • Los Angeles

***These seven corrosion test specimens** are just a few from hundreds of tests conducted by Aloyco to insure our valve customers of the right alloy for their particular job. Aloyco valves are supplied in such metals as 304 and 316 stainless steel, Aloyco 20, Nickel, Monel and Hastelloy B, C and D.*

Longer Lasting
ALOYCO
VALVES
1ST IN CORROSIVE SERVICE

ALLOY STEEL PRODUCTS COMPANY
LINDEN, N. J.

Check 1005 opposite last page.

CHEM-TRENDS / Our Growing Industry

Synthetic rubbers spark more construction activity in CPI

Synthetic rubbers are continuing to stimulate activity directly and indirectly in the chemical processing industries.

Naugatuck Chemical division of United States Rubber Co., with four years research behind its venture, will build a $2-million pilot plant in Baton Rouge, La., for trial production of ethylene-propylene varieties of synthetic rubbers, and synthetic balata. Multi-ton batches will be produced for further evaluation. Plant, described as forerunner of large-scale production, is to be completed by next fall.

Shell Chemical Company hopes to have an 80 million lb/yr polyisoprene plant, costing several million dollars, on stream near Marietta, Ohio, late in 1961. Coupled with expansion of Shell's Torrance, Calif., facility to 40-million-lb/yr capacity, this will give the company 120-million-lb/yr output.

A semi-works facility contract for recently-formed **American Rubber** and **Chemical Company's** polybutadiene and polyisoprene plant near Louisville, Ky., has been awarded to **Crawford & Russell, Inc.**, Stamford, Conn., engineering and construction firm. Multi-million-dollar plant is scheduled for completion in September 1961. American Rubber is joint venture of **Stauffer Chemical Company** and **American Synthetic Rubber Company.**

Spurred by expanding market for benzene—styrene and synthetic phenol, raw materials for rubber and resins, use over half of current capacity—**Enjay Chemical Company**, division of **Humble Oil & Refining Company**, is boosting capacity of Baton Rouge, La., plant from 15- to 24-million-

To page 10

Less Industry Enthusiasm For Heat Exchanger Standardization

Process-plant trends towards on-site repairing rather than replacing tube bundles in shell-and-tube heat exchangers . . . Increasing use of special exchanger designs such as fixed-tube sheet and U-tube . . . Growing substitution of air-cooled exchangers for greater-maintenance-requiring shell-and-tube types. All of these factors are adding up to weakening of the case for heat exchanger standardization.

In addition, recently reported higher total-cost summations, in cases where standardized exchangers were conjecturally substituted for the custom units actually used, dampens enthusiasm for standardization further. These factors are the substance of a report made by K. D. Segel of Esso Research & Engineering Co. before the recent Heat Transfer Conference at Buffalo, N.Y.

Esso's exchanger standardization studies go back to 1940, when war interrupted. In 1953, some of the equipment industry was fathomed as to standardization of 275 exchangers needed for a refinery, with the result that a 5% premium for equipment cost alone was to be incurred. Total installed cost including added piping, etc., would have made this figure much higher, according to the study.

At about the same time, another study evaluated the cost of using small standard units in place of 13 larger custom-designed exchangers. Here, equipment would have cost 30% more, with large factors having to be added for power investment to overcome increased pressure drop through the 21 smaller exchangers.

In the latest (1958-1960) study, 2200 custom shell-and-tube exchangers bought by Esso since 1946 were analyzed to find similarities which might provide a still more realistic basis for future standardization. Boiled down, these became 10 standard tube areas, 16-ft tube length, 1-in carbon steel and ¾-in non-ferrous tube diameters . . . plus fixed design pressure, baffle pitch, pass arrangement and tube layout limits.

On the basis of these new standards, Esso then re-estimated a recently completed refinery, substituting standard exchangers for 62 of the 141 custom units actually used. Result: Considering all cost factors, standard exchangers would have required capital investment of at least 15% more than for custom units, and more likely 20%.

Standardization of exchangers may not be a dead issue, but it now appears to be far more elusive than indicated by the oversimplified picture of an earlier era. ■

Major price reductions have occurred, with Carwin's polymethylene polyphenylisocyanate (used for high-temperature resistant urethane foams) dropping one-third, and Pfizer's fermentation "heavy chemical" itaconic acid and esters dropping from 10 to 27%.

Radioactive hydrogen from (NY) Con Edison's Indian Point nuclear power reactor will be catalytically burned to water and stored as such, using an Englehard platinum metal catalyst.

Exchange of scientific information of documentary nature will be expedited by a National Science Foundation "outpost" established in Japan. The first of such overseas exchanges, Tokyo was chosen because of need for greater communication on scientific matters between the United States and Japan.

Portent of future? Remington Rand is transferring manufacture of all standard and portable typewriters to European plants, with transition to be completed by 1961. One factor behind move is increasing demand for machines abroad, while it has been found impossible to produce machines here for competitive sales abroad.

Light-weight chemical fuel cell may have fuel regenerated by sunlight, making it ideal for satellites but potentially interesting for less exotic applications. Special plastic ion-exchange membranes developed by Ionics, Inc. are key part of cell design.

Beryllium minerals in U.S. exist in sufficient quantities to free us from dependence on foreign beryl, says Bruce Odlum of Beryllium Resources, Inc. An effective, economical mechanical method of concentrating these non-beryl minerals is now practical. Doubling of the industry within a few years is expected.

BASE, W. Germany's second largest chemical company, is having Thompson Ramo Wooldridge install an RW-300 digital computer control system for one of its "major processing units" — first outside the U.S.

Another U.S. chemical company goes to Europe for basic research, as Tennessee Eastman establishes in Zurich, Switzerland, facilities to be operated by Eastman Research A.G.

Polypropylene will be made in England and Holland, under license arrangements completed between Montecatini and ICI (for a 10,000-annual-ton plant in England), and with Bataafse Petroleum Maatschappij N.V. (for a plant in Rotterdam, in connection with Shell Netherlands Raffinaderij N.V.).

The ammonium nitrate revolution is "likely to eliminate any further significant increases in demand for dynamite," says Ralph K. Gottshall, Atlas Powder Co., in closing the firm's Richmond, Calif., dynamite plant.

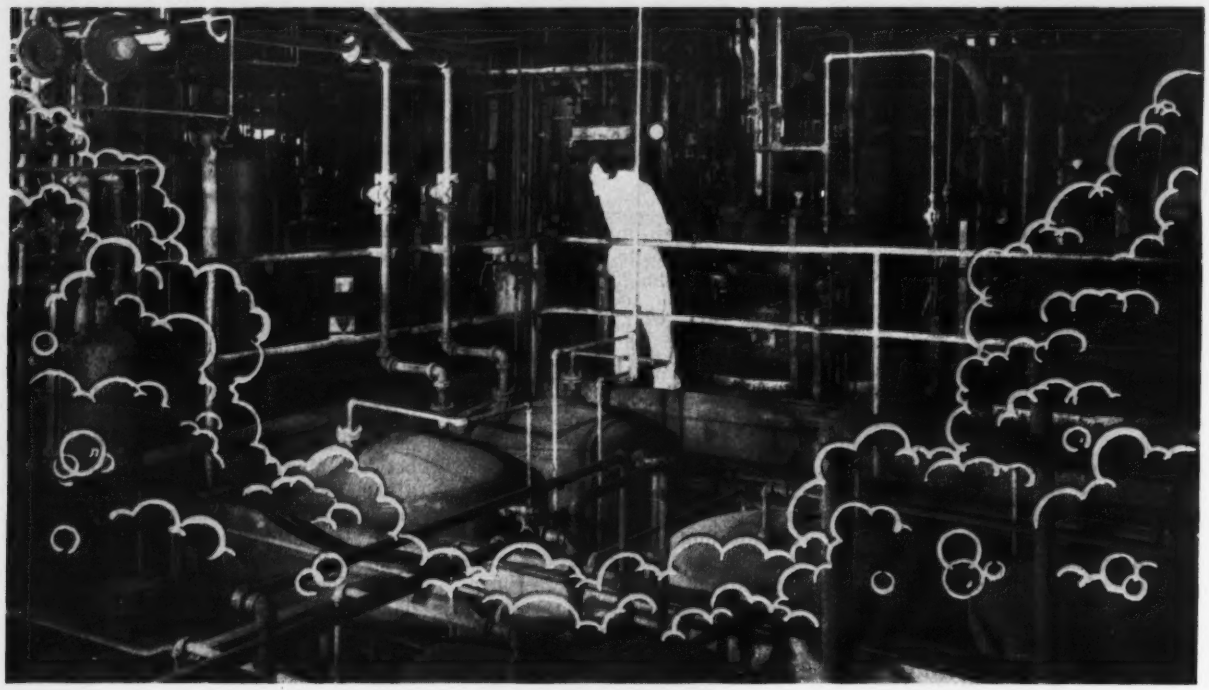
Small growth companies must learn to be adept at compromise if they wish to succeed at capital management of promising new projects, commented R. L. Purvin, Foster Grant Co., before recent ACS National Meeting. He further warned that the spreading of responsibility in large corporations "virtually encourages over-caution in order to follow safe rules and avoid any mistake that can not be blamed on the system."

Some Russian scientific and technical publications are being translated abroad, paid for out of surplus U.S. agricultural commodities, under a National Science Foundation program.

Ethylene-propylene copolymer rubber looms important as Hercules announces its EPR development product, and Montecatini proceeds with its Brindisi, Italy, production facility.

SILICONE NEWS from Dow Corning

Foam Eating Into Profits?



Job-proved Dow Corning Defoamers Speed Processing, Raise Capacity

Ever try to blow up a balloon with a hole in it? Hard to get it up to any size, isn't it. The same's true of foamers . . . with Dow Corning Silicones added. Silicones put holes in bubbles . . . keep systems foam-free! They're perfect foam controllers: reliable, economical, safe, easy to use . . . quickly available from Dow Corning warehouses conveniently located to expedite shipment to you.

No Hold-Ups. No Foam-Overs. Production slow-downs caused by foam are eliminated when fast-working Dow Corning Silicones are added to systems. The absence of foam permits you to make more efficient use of equipment, step up production and meet schedules never before thought possible. Capacity is increased, and foam-overs are prevented . . . thereby cutting cost of clean-up and maintenance and helping reduce fire hazards.

Eliminate foam-overs here.

What's Your Foamer? Today, Dow Corning Silicones are used both as antifoamers and as defoamers in processing chemicals, petroleum products, asphalt, textiles, paper, paints, adhesives . . . in metalworking and laboratory work . . . in virtually every industry and process — even in food processing where the use of Dow Corning Silicones at designated levels is sanctioned by FDA.

If you're troubled with foam slowing down your plant operation, taking up productive capacity, or creating maintenance, it'll pay you to test Dow Corning Silicones.

New Literature and Free Sample. A new 8-page manual, "The ABC's of Defoaming", will help you learn all the facts about Dow Corning silicone defoamers . . . how and where to use them, examples of the small quantities of silicones needed to control foam, and typical successful applications. Write today for your FREE copy and ask for a generous FREE SAMPLE of the silicone defoamer that you can test . . . that will likely give you the most efficient, most economical defoaming action. Indicate your type of foamer: aqueous, oil, food or other. Address Dept. 2111.

Write today for new 8-page brochure, "How Silicones Work for the CPI". Yours Free!

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

Check 1006 opposite last page.

From page 8

gal/yr. Expansion is to be completed by end of year.

Benzene—30 million gal/yr—and toluene will be produced by multi-million-dollar facility to be erected at Beaumont, Texas, by **Mobil Chemical Company,** operating division of **Socony Mobil Oil Company, Inc.** Construction is to be completed and production started within 16 months.

A $13-million chlorine and caustic soda plant at Charleston, Tenn., and $1.5-million phosphoric acid plant at Joliet, Ill., are being planned by **Olin Mathieson Chemical Corporation.** The 180-ton/day Tennessee facility is to be in production by the end of 1961. The phosphoric acid plant will produce 50,000 tons/yr of 75% concentrate and is to be completed by April 1961.

Engineering and construction contracts for $20-million ethylene and ethylene oxide plant to be built for **SunOlin Chemical Company** at Marcus Hook, Pa., have been awarded to **The Lummus Company, New York.** Scheduled for completion late in 1961, it will have capacity of 225 million lb/yr of ethylene and 55 million lb/yr of ethylene oxide. SunOlin is jointly-owned by **Olin Mathieson Chemical Corporation** and **Sun Oil Company.**

Solvay Process Division, Allied Chemical Corporation, is expanding chlorine-caustic soda production to 100 tons/day at Brunswick, Ga., facility.

Allied's **National Aniline Division** is expanding caprolactam monomer capacity by 75% at Hopewell, Va., and caprolactam polymer and nylon tire yarn capacity at Chesterfield, Va., by almost 200%. Multi-million-dollar expansion is to be completed by mid-1961. **The Lummus Company** will engineer and design Hopewell plant while **United Engineers and Construction, Inc.** has engineering, design and purchasing contract for Chesterfield project.

Phthalic anhydride and phthalate ester plasticizers will be produced at multi-million-dollar installation to be built for **Monsanto Chemical Company** on 650-acre site 20 miles

southwest of Camden, N.J. along the Delaware river. Plant will be Monsanto's third and largest in New Jersey—23rd in U.S. To be completed early in 1962, units will increase phthalic anhydride capacity by more than 30% and phthalate ester capacity by over 50%.

Dow Badische Chemical Company (jointly owned by **Dow Chemical Company** and **BASF Overzee N.V.**) will have butanol facilities at Freeport, Texas, in production early next year. Dow Chemical will handle sales of n-butanol and iso-butanol produced by facility.

Construction is underway at a 290-acre site at Fords, N.J., on 24 million lb/yr maleic anhydride plant for **Heyden Chemical Division of Heyden Newport Chemical Corporation.** Production will start early next year.

Ammonia synthesis converter with 350 tons/day capacity will be feature of multi-million-dollar ammonia plant to be built by **Chemical Construction Company** for **U.S. Phosphoric Products** in Tampa, Fla. Plant, to be completed late in 1961, will use natural gas as raw material.

Michigan Chemical Corporation has put on stream its expanded bromine facilities at El Dorado, Ark., thereby doubling its capacity. Plant is joint venture with **Murphy Corporation** of El Dorado.

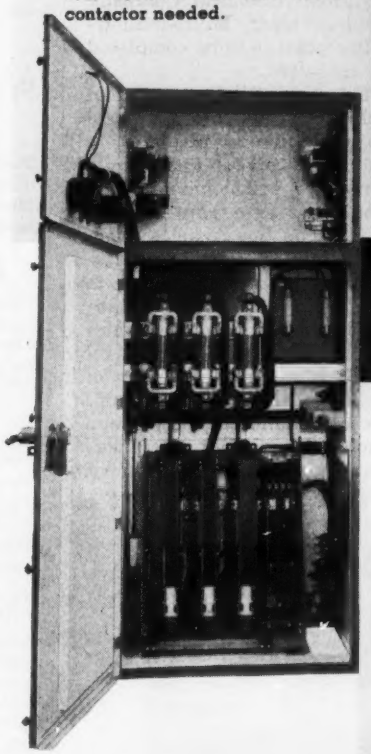
Vitro Minerals Corporation has been granted a loan by the Office of Minerals Exploration, U.S. Department of Interior, for conducting exploratory work on its new beryllium property in the Topaz Mountain area of Juab County, Utah. Deposit, which appears to be of a new type of beryllium ore, was discovered in 1960.

Construction has been started on a 12-acre site in Vancouver, Wash., for an **American Cyanamid Company** plant to produce chemicals for that area's paper industry. The plant is expected to be in operation early next year.

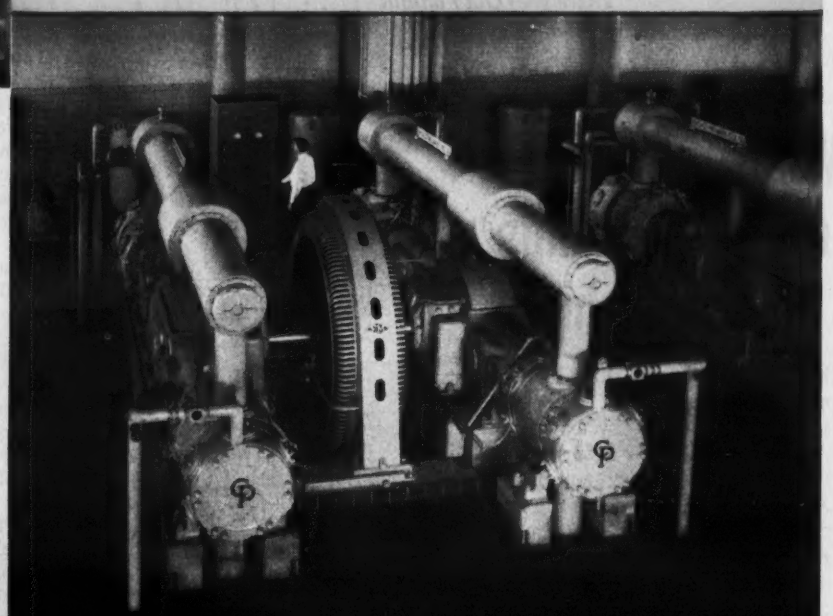
Reichhold Chemicals, Inc. will expand its Jacksonville, Fla., facilities to include a 10-million-lb/yr combination unit

Above and at right • Four EC&M 1000 HP, 2300 Volt Synchronous Starters on air-compressor drives in Chrysler Corporation's new Ohio Stamping Plant at Twinsburg. Purchased and installed by Hatfield Electric Co., Cleveland, Ohio.

Below • Inside view of starter showing compact arrangement of fuses and contactor. The three arc shields slide out for quick access to both front and rear contacts—no draw-out of contactor needed.



The most complete synchronous motor protection you can buy



EC&M 2200-4800 VOLT STARTERS

• A push of the "start" button gives you complete protection during starting and running—*plus* EC&M *fully automatic synchronization.* Throughout the entire sequence, motor windings are completely protected and synchronization occurs at the most favorable time. Should the motor pull out of step because of voltage dip or overload, the field is automatically removed. Re-synchronization occurs when the motor re-accelerates the load. Short circuit protection is provided by current-limiting power fuses working in conjunction with EC&M's *"certified"* high-interrupting-capacity ZHA air-break contactor.

For complete details...

WRITE FOR BULLETIN 8210

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

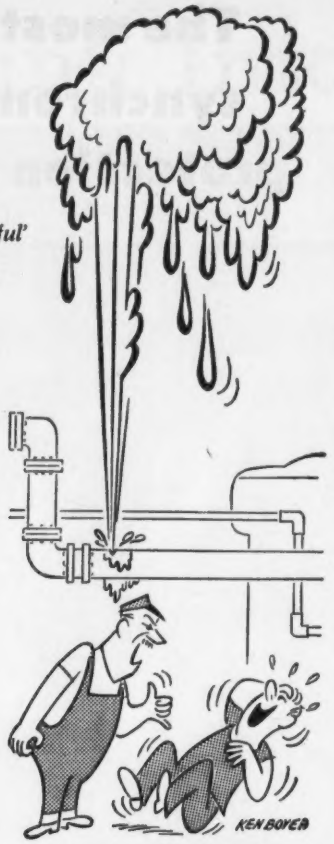
wherever electricity is distributed and controlled

8897-R

Check 1007 opposite last page.

Life in these excited states...

"Stop saying 'There goes Old Faithful' and get it fixed!"



What to do when corrosion sends costs sky high

No one can afford ruined equipment, endless repairs, and plant shut-downs caused by corrosion. And you *shouldn't* afford *over*-design and too-fancy equipment. Ace takes you right down the middle . . . a wide choice of chemical-resistant pipe, pumps, valves, tanks, etc. Best for the money anywhere . . . backed by 108 years' experience.

Best non-metallic pipe anywhere for *hot* chemicals to 275°F. Also handles tough organics. Rigid, tough nitrile. Pipe and fittings to 8". *Bul. 96A.*

Improved design . . . now 12 gpm. All wetted parts acid-resistant, wear-resistant Ace hard rubber. Finest available. *Bul. CE-55.*

Heavy Ace rubber and plastic tank linings unexcelled for alkalies, acids, bleaches, salts. Faultless seams, indestructible bond, shock and age-resistant. All shapes. *Bul. CE-53.*

Special equipment often can be machined, punched or welded of standard plastic or hard rubber sheet, rod or tubing. Write for details today.

ACE *chemical resistant equipment*

BY **AMERICAN** HARD RUBBER COMPANY

DIVISION OF **AMERACE** CORPORATION

ACE ROAD • BUTLER, N.J.

See ACE equipment in Chemical Engineering Catalog

Check 1008 opposite last page.

for production of polyester and alkyd resins. Facility, sixth to be added by Reichhold during past five years, will cost approximately $500,000.

Merger of **Federal Chemical Company, Inc.** with **National Distillers and Chemical Corporation** has been approved in principle by boards of both companies. Federal is 76-year-old, six-plant manufacturer of mixed fertilizers. National will offer approximately eight shares of its common stock for each of 20,000 shares of Federal common stock outstanding, and four common shares for each of 21,494 preferred shares outstanding. Federal will be operated under present name by its present management as division of National.

Foster Grant, Inc. plans to locate a polyethylene plant in Beaumont, Texas, adjacent to the **Mobil Chemical Company** ethylene plant. Multi-million-dollar plant is to be completed by mid-1961.

Tidewater Oil Company and **Collier Carbon and Chemical Corporation** are planning to build and operate a 50-million-lb/yr petroleum naphthalene plant as a joint venture at Collier's Los Angeles plant. Multi-million-dollar facility, scheduled for completion in late 1961, will utilize raw material from both Tidewater and **Union Oil Company of California**, parent company of Collier. Collier and Tidewater are also building a petroleum naphthalene plant at Tidewater's Delaware refinery, south of Wilmington.

"Good heavens, it says 'Get out diagram 12, sheet 6, condenser number 3 is developing a short.'"

MM

STANDS FOR DEPENDABLE QUALITY DELIVERY SERVICE

Wire Cloth—Filter Cloth

Available from stock in all alloys, all weaves, all meshes, up to 244" wide—in rolls or cut to size. "Micromesh" ultrafine strong stainless filter cloth for retention of particles from 25 to 5 microns. Also backing and spacing cloth and screens.

Rescreening Service

On tension rings for vibrating screens.

Neva-Clog

Double layer, perforated, alloy sheet medium—smooth, strong, rigid—for diatomite filters, centrifuges, ion exchangers, carbon towers, dust and fume control.

Filter Leaves

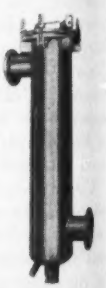
"Rim-Lok" and other Multi-leaves for pressure filters; standard leaves for stationary and rotary filters.

Strainers

"Individualized" strainer elements and housings, designed and built by Multi-Metal to meet process needs not served by available standard units.

Custom Fabrication

Requiring wire cloth elements: screens for filter presses, tubular filter elements, cylinders, baskets, process unit components, etc.



Write for Catalog 57.

MM

MULTI-METAL WIRE CLOTH CO., INC.

1356 GARRISON AVENUE, NEW YORK 59, N. Y.

Check 1009 opposite last page.

THAT'S INTERESTING

Adjustable sunglasses

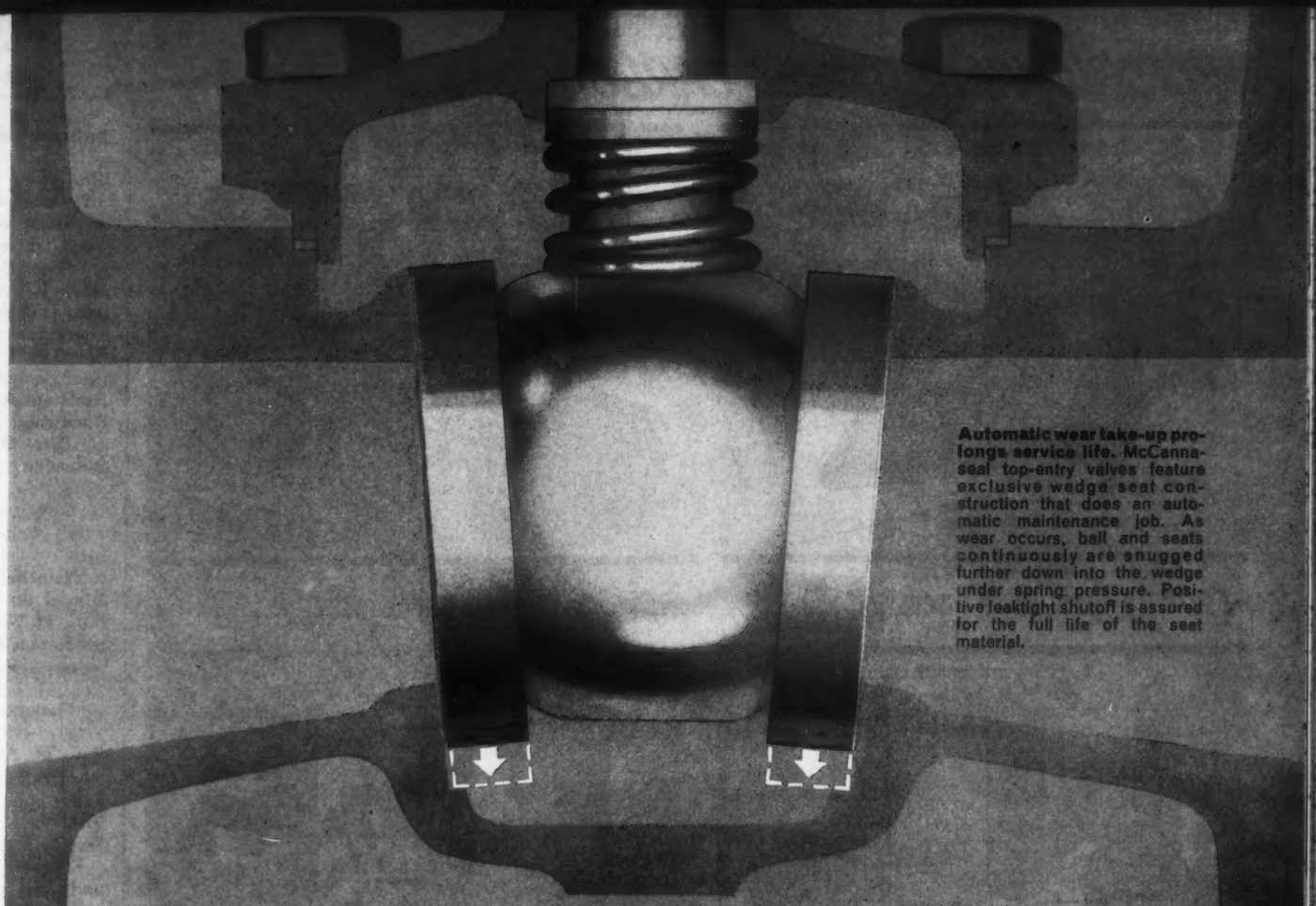
Light intensity in windows, shades, visors and sunglasses could be controlled automatically by means of phototropic materials which change color when exposed to light but revert to original color when light is removed. Possibility of such use is suggested by Air Force study.

Tattletale dust count

By measuring the dust level in the air, scientists can tell how many troops are marching and how many vehicles are moving in a specific area.

The technique is based on measuring the concentration and size distribution of dust particles in the air utilizing a counter developed by Armour Research Foundation

For more information on product at right, specify 1010 see information request blank opposite last page.

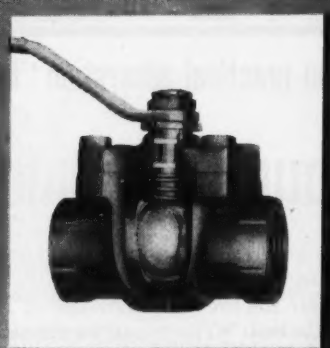


Automatic wear take-up prolongs service life. McCannaseal top-entry valves feature exclusive wedge seat construction that does an automatic maintenance job. As wear occurs, ball and seats continuously are snugged further down into the wedge under spring pressure. Positive leaktight shutoff is assured for the full life of the seat material.

McCannaseal Top-Entry Ball Valves

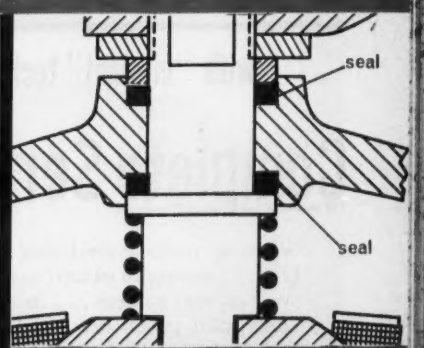
. . . the valves with wedge seat design that automatically adjusts for wear

New catalog gives complete data all types Hills-McCanna ball valves ¼" through 8", for pressures to 1000 psi, temperatures to 450°, manual or motor-operated. Includes dimensions, materials, Cv values, corrosion-resistance data—everything required for selection and piping layouts. Send for your copy today.



Fast quarter-turn operation from full-open to full-close. Screwed, flanged, or socket weld connections 2" to 8" sizes.

In-line maintenance. Simply remove ball and seats, reassemble with new seats, and you're back in business in a matter of minutes.



Leaktight stem seal. Double seals are under compression at all times—and the higher the line pressure, the tighter the seal.

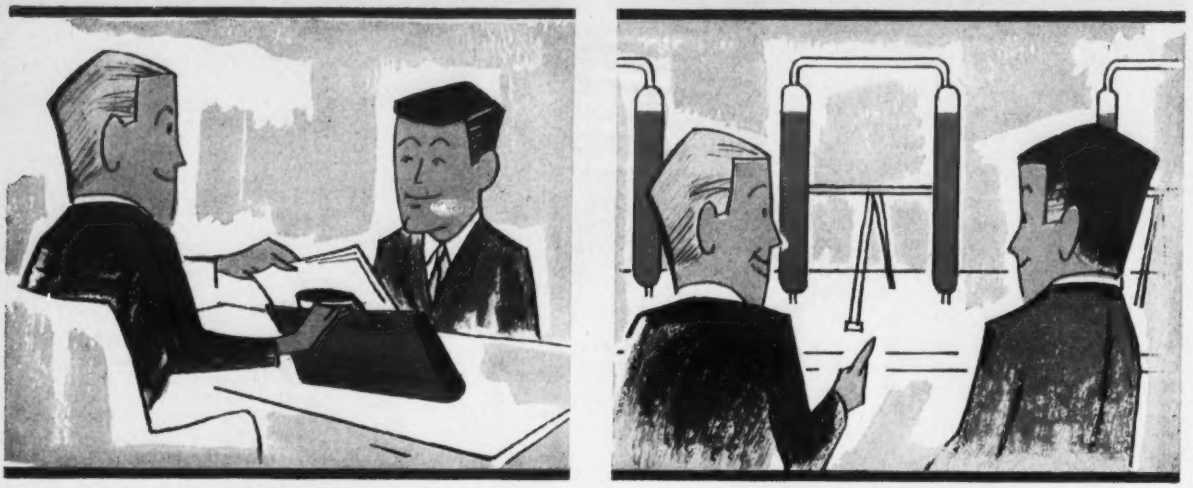
A complete line of standard and special top-entry and bar stock valves for gases, liquids, vacuum . . . including models with high temperature and secondary fire seats.

"McCannaseal" is a registered trademark. Patents pending.

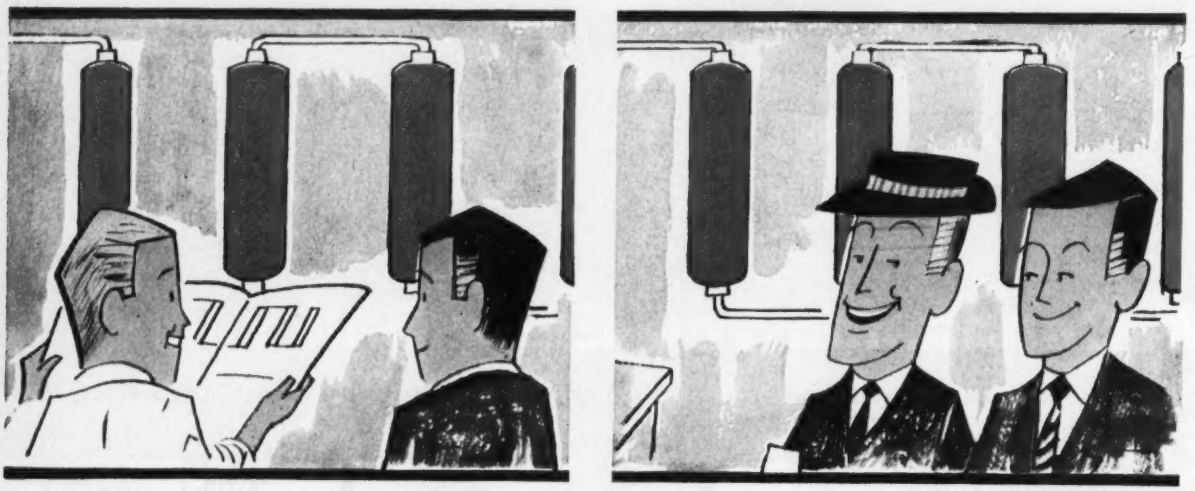
HILLS-McCANNA COMPANY

4600 WEST TOUHY AVENUE, CHICAGO 46, ILLINOIS

PITTSBURGH ACTIVATED CARBON Service in Action–



From initial discussion ..... through pilot testing .....



with "in-plant" technical service ..... based on practical adsorption "know-how"

Complete Service from Pittsburgh Chemical Co.

Whether you're considering a new adsorption system ... . trying to obtain maximum efficiency from your present system . . . or concerned with general adsorption problems, Pittsburgh stands ready to assist you in all phases of adsorption engineering.

Pittsburgh technical representatives, who sell and service Pittsburgh Activated Carbons only, are thoroughly experienced and trained to put their adsorption "know-how" to work for you. A Pittsburgh evaluation of your present system, for example, may enable you to significantly reduce processing costs, increase efficiency and improve end product quality. If you are planning a new plant, a technical representative will work right along with your engineers, if desired, from laboratory scale to "on stream" operation.

Investigate the proven advantages of Pittsburgh Granular Carbon. Write or call for the services of a Pittsburgh Technical Representative. He'll be pleased to discuss adsorption with you from a practical standpoint . . . *without any obligation.*

ACTIVATED CARBON DIVISION 2365

PITTSBURGH CHEMICAL CO.

GRANT BUILDING PITTSBURGH 19, PA.

A Subsidiary of PITTSBURGH COKE & CHEMICAL CO.

Check 1011 opposite last page.

letters from readers

Ball valves

Sirs:

I would like to extend my words of congratulations and "well done" for your ball valve article* of your August issue. It was very informative and I feel will create new interest in the ball valve with the CPI.

ROBERT J. MURPHY
Assistant Advertising Manager
Rockwood Sprinkler Division
The Gamewell Company
Subsidiary of E. W. Bliss Co.
Worcester, Mass.

Sirs:

Your ball valve story* has stirred up quite a commotion here at W-K-M. I hope your prediction for 1961 comes true as to sales.

E. W. FARMER
Manager, Public Relations
W-K-M
Div. of ACF Industries, Inc.
Houston, Tex.

Sirs:

Enjoyed your very thorough and well done symposium of ball valves* in the August issue. Many of us come to look upon a long used product as "standardized," and it is well to realize every now and then that new items are being made that improve on these "standards," such as the butterfly valve and now the ball valve illustrate.

N. B. HEAPS
Industrial Sales Supervisor
Mission Manufacturing Co.
Houston, Tex.

Protective tariffs

Sirs:

We have had many fine comments about your article on tariffs ("Chemical Producers Temper Views On Protective Tariffs," Aug., p. 27).

We would like permission to reprint the article for distribution among our members.

DOUGLAS E. CAMPBELL
Secretary
Pulp Chemicals Association
New York

* See "'Cinderella' ball valves strike it rich in CPI," Aug. CP, p. 34.

Foreign-competition spectre

Sirs:

It was with more than a casual interest that I read John Mellecker's article[1] on the problems confronting the U.S. chemical industry abroad. The article points out many specific problems of which we in the engineering-construction business have long been aware. Please accept my congratulations on this excellent comprehensive coverage . . .

DAVE FULTON
Vice President, Sales
Chemical Construction Corp.
New York

Sirs:

The article[1] is very interesting and provides information of value to people who are working in the overseas field.

H. REEVES
International Department
Hercules Powder Company
Wilmington, Del.

Sirs:

I particularly enjoyed the article "Rising World Competition Threatens U.S. Chemical Leadership"[1] which, I believe, accurately reports the situation in the international chemical field today. It should contribute to a better understanding of the problems faced by the U.S. chemical industry abroad and lead to an improved atmosphere in which practical solutions may be found.

E. G. HEESE
Managing Director
Cyanamid International
New York

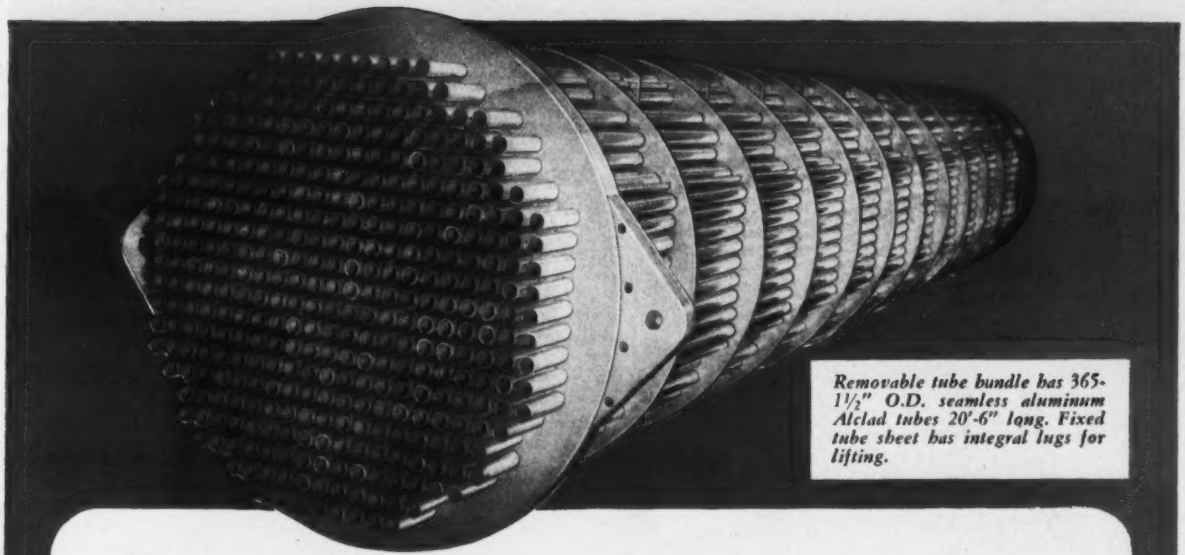
Brine-filter article wins bravos

Sirs:

The article[2] that you did on the brine-filter installation in our department was very nicely done. The information,

1) See "Rising World Competition Threatens U.S. Chemical Leadership," August CP, p. 23.
2) See "Brine filtration goes semi-automatic; downtime plunges, clarity climbs," Aug. CP, p. 38.

All Aluminum
DUAL PURPOSE ABSORBER-COOLER

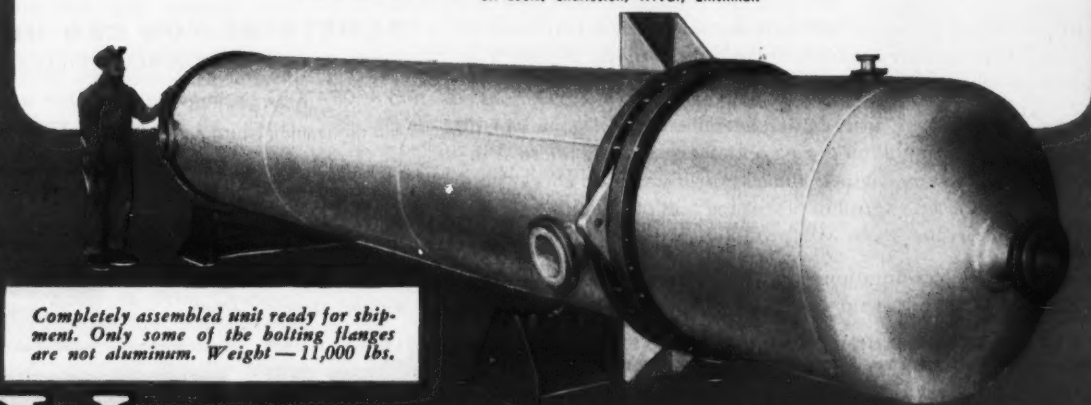


Removable tube bundle has 365-1½" O.D. seamless aluminum Alclad tubes 20'-6" long. Fixed tube sheet has integral lugs for lifting.

Two units like this were built for an AMMONIA FERTILIZER PLANT. Operating in a vertical position, they are unique in that they serve a dual purpose.
A nitrogen solution is directed downward in uniform film flow, on the inside of the tube walls. At the same time ammonia vapor is introduced in the stream. The nitrogen solution, cooled as it travels in film flow down the tubes, *at the same time absorbs ammonia* from the vapor flowing thru the center core of the tubes.
Cooling water in the shell, baffled to direct the flow for maximum efficiency within pressure drop limitations, removes the sensible heat and the heat of reaction of the nitrogen solution. Perhaps combination units like this would solve your cooling-absorption problem. Discuss it with our engineers, without obligation. *Address Dept. 24A-XCP.*

HENRY VOGT MACHINE CO., LOUISVILLE, KY.

SALES OFFICES New York, Chicago, Cleveland, Dallas, Camden, N.J., St. Louis, Charleston, W.Va., Cincinnati



Completely assembled unit ready for shipment. Only some of the bolting flanges are not aluminum. Weight — 11,000 lbs.

Vogt HEAT TRANSFER EQUIPMENT

Check 1012 opposite last page.

. . . WITH EVERY SWENSON INSTALLATION!

You buy more than precisely fabricated metal whenever you invest in a Swenson Evaporator, Crystallizer, Dryer, Filter or Pulp Washer. You also purchase the close, personal interest of your Swenson engineer.

Swenson engineering integrity demands meticulous preliminary planning, insists on pre-installation testing and oversees every phase of installation. Your Swenson engineer makes post-installation checks, too, assuring the continuous control of processing and production that has made "Swenson" synonymous with profitable, trouble-free operation.

For experienced consultation—and accurate cost studies—you'll find a Swenson engineer at the other end of your phone.

SOMETHING YOU CAN USE!

Ask for Bulletin SW 205—*FORCED CIRCULATION EVAPORATORS*—eight-page treatise on salting and non-salting types, single and multiple effects. *Swenson Evaporator Company, 15667 Lathrop Ave., Harvey, Illinois. In Canada: Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.*

PROVED ENGINEERING FOR THE PROCESS INDUSTRIES SINCE 1889

SWENSON

A Division of WHITING Corporation

WHITING-MANUFACTURERS OF CRANES; TRAMBEAM® HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES,® FOUNDRY, AND RAILROAD EQUIPMENT

Check 1013 opposite last page.

as presented, was correct and there were no errors.

Please accept our appreciation for presenting the article in a first class manner.

JOHN T. FERGUSON
General Superintendent
Electro-Chemical Division
Diamond Alkali Company
Cleveland, Ohio

Epoxidation—phthalate ester mix-up

Sirs:

We found your article on epoxidation to be interesting. We hope that you will write more of this type of information in the future. At one point in the discussion, you mentioned that "only half as much plasticizer is required if 20 parts of epoxide plasticizer are used with 35 parts diethyl phthalate."

As prime manufacturers of diethyl phthalate, we are very interested in such new developments. However, it is possible that you meant to say dioctyl phthalate. Could you clarify this for us please?

R. L. ERICKSON
Development Department
Kay-Fries Chemicals, Inc.
New York

We passed Mr. Erickson's question along to Mr. Ralph J. Gall, assistant manager of industrial applications, peroxygens-organics, FMC Chemicals Division, who aided by supplying information for the article. His reply was:

"The statement more correctly should have read "dioctyl phthalate" rather than "diethyl phthalate." This sentence was intended to be only a further development of the preceding sentence ('In a typical conventional formulation, 100 parts PVC are blended with 55 parts dioctyl phthalate plasticizer and 3 parts stabilizer which costs $0.50-5.00/lb.') The lower phthalate esters such as diethyl and dibutyl, of course, have been utilized in conjunction with the epoxy plasticizers for some formulations, but generally speaking, they are a little too volatile for general-purpose use."

Spotlight On People

Four vice presidents named at Union Carbide Chemicals

Four vice presidents have been appointed at Union Carbide Chemicals Company, division of Union Carbide Corporation. They are: **Richard F. Brown,** vice-president — sales; **Robert L. Duncan,** vice-president — product marketing; **Thomas R. Miller,** vice-president — research and development; and **Arthur P. Moss,** vice-president and works manager. Brown and Duncan will report to Vice-president **John A. Field** who heads chemical marketing activities of the company, while Dr. Miller and Mr. Moss will report to Vice-president **Kenneth H. Rowland** who coordinates company efforts in research and development, production and engineering.

Brown

Duncan

Miller

Moss

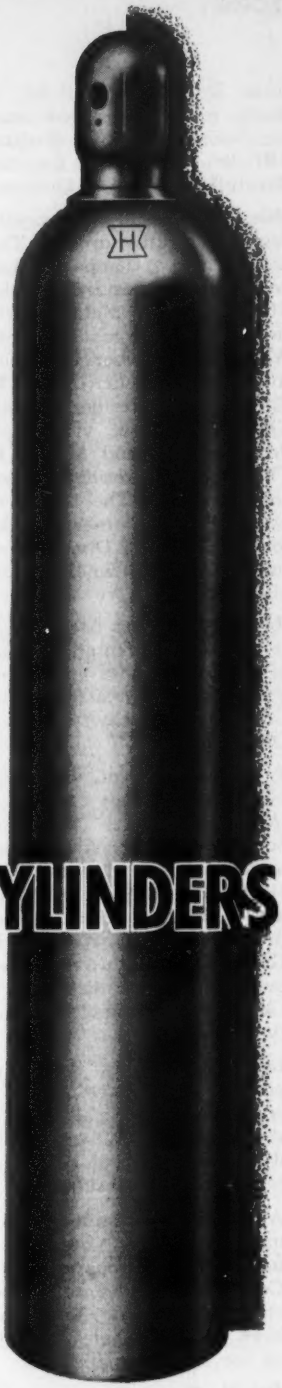
At Union Carbide Plastics Company, appointments of **John D. Benedito** as vice-president — special projects, and **Richard M. Joslin,** vice-president — sales, were announced.

A new board member and two new vice presidents of Monsanto Chemical Company have been elected by the board of directors. Joining the board and the company's executive committee is Vice-president **J. L. Christian. Edward J. Bock** and **Tom K. Smith Jr.** were advanced to vice-president status. Bock succeeds Christian as general manager of the Inorganic Chemicals Division, while Smith became general manager of a new division, the Agricultural Chemicals Division. In another administrative change, **Dr. James H. Lum,** director of technology for the Organic Chemicals Division, was appointed assistant to the president of Monsanto and secretary of the executive committee. He succeeds **Shea Smith III** who is now director of economic planning for the Overseas Division, a newly created position.

Seven Olin Mathieson Chemical Corporation executives have been promoted. They include: **A. T. Zodda** and **Fred J. Stock,** corporate vice presidents; **N. Harvey Collisson,** senior vice president and chairman of the staff committee; **Milton L. Herzog,** vice president and general manager of the Metals Division; **Richard M. Furlaud,** vice president and general manager of the corporation's International Division; **Gordon Grand Jr.,** vice president for law and administration; and **Arthur T. Safford Jr.,** corporate vice president for marketing.

To intensify top-management attention to growth and expansion and supply strong administrative direction, General Aniline & Film Corporation's executive management has been reorganized. Two new positions directly under the president, to be known as group executives, have been created. **Dr. Leopold F. Eckler,** corporate vice president and formerly general manager of the Ansco Division, and **Harold G. Shelton,** formerly general manager of the company's Dyestuff & Chemical Division, are filling these

MEETS RIGID SPECIFICATIONS



HARRISBURG CYLINDERS

Among the many reasons for longevity and dependability of Harrisburg cylinders are the rigid tests and inspections to which the cylinders are subjected.

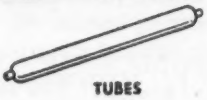
For example maximum control of cylinder wall thickness is attained through the use of an XactRAY Gauge. This instrument is used to measure wall thicknesses throughout the length of the cylinder shell. In addition to the XactRAY gauge; Vidigages, Sonigages and Magnaflux Testing are available for use as required.

These instruments, of course, are supplementary to exhaustive I. C. C. inspections and tests which make possible effective control of wall thickness for minimum weight consistent with maximum service life.

More than a Century in Harrisburg 24, Pa.

H HARRISBURG STEEL CO.

Division of HARSCO CORPORATION



TUBES

TRANSPORTS

FLANGES

COUPLINGS

Check 1014 opposite last page.

posts. Dr. Eckler will be in charge of the Ansco and Ozalid Divisions, while Shelton will be responsible for the Dyestuff & Chemical Division.

Miles M. Zoller, vice president and director of The Eagle-Picher Company, has been named president of the Chemicals and Metals Division. Also promoted were **William D. Atteberry,** executive vice president; **Donald R. Carter,** vice-president—sales; **Claude O. Dale,** vice-president—mining; and **Melvin F. Chubb,** vice-president—electro-chemical. The division was formed by merging the former Chemical Division and the Mining and Smelting Division.

Ross A. Corio has been named to the newly-created position of vice-president—marketing and sales for W. R. Grace & Company's Hatco Chemical Division.

F. Leonard Bryant, vice president of Hooker Chemical Corporation since 1957, has been elected executive vice president and a director. Also elected directors were **Thomas F. Willers,** Hooker vice president, and **Werner P. Gullander,** executive vice president and director of General Dynamics Corporation.

Louis Bay II has been appointed senior vice president of Dixon Chemical & Research, Inc., with responsibility for operation of Dixon International, a subsidiary.

A separate marketing department has been created to handle the Nitroparaffins for Commercial Solvents Corporation. **Frank E. Maple** has been appointed sales manager of the new department.

Dr. M. M. Gladstone has become manager of the Emcol Division of Witco Chemical Company's Organic Chemicals Division. His responsibilities include Emcol marketing, new product development and coordination of production and sales.

Dr. Raymond Wynkoop has been appointed director of a newly-organized Commercial Development Division in Sun

JUST SPRAY IT ON! Of fine talcum powder consistency, "SCOTCHKOTE" Protective Resin No. 101 applies easily with a flocking type spray gun. Temperature of unit to be coated should be 410°F. to 450°F. Upon contact, resin flows and forms a uniform, smooth

Now...spray on protection

New "SCOTCHKOTE" Brand Protective Resin No. 101 launches a new era in corrosion prevention

Now, from 3M, a 100% epoxy resin you can spray on fittings, couplings, and other pipe hardware for positive corrosion protection. "SCOTCHKOTE" BRAND Protective Resin 101 is supplied in one-part powder form, completely ready to use—no mixing or solvent hazard. Sprayed on parts pre-heated to 430°F., it flows on contact to form a smooth even coat, then cures to a strong impact-resistant finish in less than 60 seconds—with no waste.

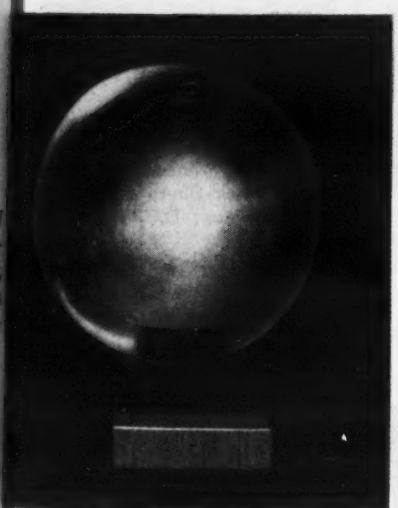
"SCOTCHKOTE" Resin stays in place. Will not flow under pressure nor flow upon heating as thermoplastics do. Provides excellent protection against corrosion at temperatures up to 250°F. "SCOTCHKOTE" Resin 101 resists attack by hydrocarbons, fuel oil, gasoline, kerosene, sweet and sour crude, and many other chemicals. Having the superior adhesion and impact strength of a true epoxy, "SCOTCHKOTE" Protective Resin 101 provides excellent resistance to damage from soil or pipe movement. Assures a minimum of damage from handling or backfilling.

New "SCOTCHKOTE" Protective Resin 101 adds a shield of lasting protection. Yet, the "in the ground" costs of objects protected with "SCOTCHKOTE" Resin is often less than that of less efficient coatings.

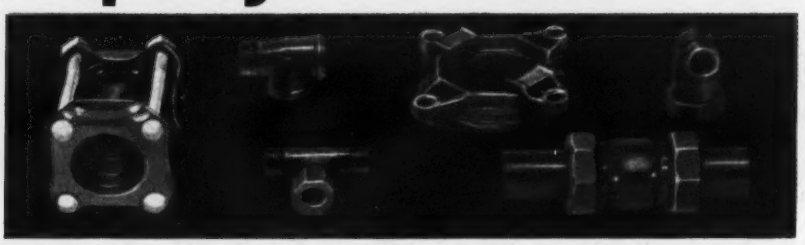
For more information on "SCOTCHKOTE" Protective Resin 101 write to 3M Co., Dept. EAO-110, St. Paul 6, Minn.

coating which cures in place without post baking in most cases. Over-spray is gathered in dust collector for re-use so there is no waste of material. "SCOTCHKOTE" Resin 101 eliminates shelf-life problems, mixing, weighing and solvent hazards.

on with 100% Epoxy Powder



IMPACT TEST PROVES SUPERIORITY OF "SCOTCHKOTE" RESIN COATING 1.434-pound ball dropped from height of 8 feet shatters ordinary pipe coating. Eight-pound ball dropped from height of 6 feet six times on "SCOTCHKOTE" treated panel fails to disbond coating. Over 3,000 psi adhesion restricts damage to the point of severe impact. This is just one proof of the many superiorities of "SCOTCHKOTE" Resin.



PROTECT EVEN "DIFFICULT" SHAPED FITTINGS EASILY "SCOTCHKOTE" Resin can be sprayed on almost any shaped fitting or coupling. Odd-shaped valves, tees, and couplings, are the most difficult objects to protect. Now with "SCOTCHKOTE" Resin they can be brought to the job site with a "factory controlled" protective coating.

FOR MORE DETAILED INFORMATION on "SCOTCHKOTE" Protective Resin 101 write to 3M Co., Dept. EAO-110, St. Paul 6, Minn.

Electrical Products Division

"SCOTCHKOTE" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN. EXPORT: 99 PARK AVE., NEW YORK. CANADA: LONDON, ONTARIO.

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

Check 1015 opposite last page.

Oil Company's Research and Engineering Department. **Dr. Egbert M. Kipp** succeeds Dr. Wynkoop as manager of Sun's Basic Research.

S. Bruce Humphrey is new director of marketing for Carus Chemical Company, Inc.

Dr. Moses Konigsberg, vice president of Polymer Industries, subsidiary of Philip Morris, Inc., has been assigned full responsibility for market planning.

Jason Cooper Jr., has been named employee relations manager by the Esso Standard Division, Humble Oil & Refining Company. **J. Edwin Hughey**, acting employee relations manager, becomes administrative assistant to Esso President **William W. Bryan.**

Philip H. Augerson and **Robert F. Dawson** have been appointed vice president and vice-president-marketing, respectively, for Dyna-Therm Chemical Corp.

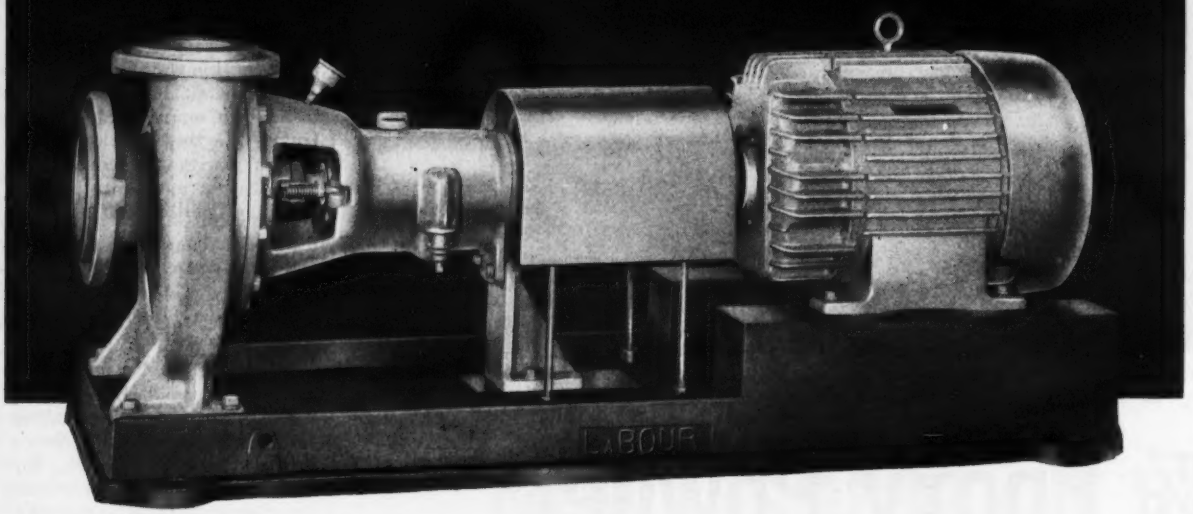
Appointments of **Douglas H. Ross** as director of planning and **Joseph L. Marzak**, director of market research, for Allied Chemical's Commercial Development Department, have been announced. In Allied's Solvay Process Division, a market research division has been created within the development department. **Wendell T. Butler** is manager of market research.

"I wish I had your outlook on life!"

Now–

Famous La Bour "Q" Performance

Plus New Servicing Advantages



For many years LaBour Type Q pumps (non-priming) have been setting industry records for sustained efficiency and freedom from vapor- or air-binding. Now this same remarkable pump is available as Type SQ, so constructed that the impeller and all other rotating parts may be removed or replaced without disturbing pipe connections or motor.

Type Q and the new SQ pumps reduce liquid travel within the casing to *less than one revolution of the impeller.* This fact, together with other design features, produces efficiencies as high as 80% and more, with an open impeller and no close clearances inside the pump. Since performance does not depend on close clearances, relatively great increases due to corrosion or wear have negligible effect on the efficiency of these pumps.

If you want to know how either of these units can help to reduce liquid-handling costs in your plant, write for our new bulletin on Q and SQ pumps.

ORIGINAL MANUFACTURERS OF THE SELF PRIMING CENTRIFUGAL PUMP

LABOUR

THE LaBOUR COMPANY, INC. • ELKHART, INDIANA
WHITE PIGEON, MICH. • LONDON, ENGLAND

Check 1016 opposite last page.

conventions and exhibits

Nov. 9-10. Chemical Marketing Research Association, Pittsburgh Hilton Hotel, Pittsburgh, Pa.

Nov. 14-16. The National Association of Corrosion Engineers, Canadian (Eastern Meeting) Montreal, Quebec.

Nov. 28-*Dec.* 2. The 24th National Exposition of Power & Mechanical Engineering, Coliseum, New York City.

Dec. 3-9. Chemical Specialties Manufacturers Association, 47th Annual Meeting, Hollywood Beach Hotel, Hollywood, Fla.

Dec. 8. Synthetic Organic Chemical Manufacturers Association, Annual Meeting, Hotel Roosevelt, New York City.

Dec. 11-14. American Nuclear Society, Meeting, Mark Hopkins Hotel, San Francisco, Calif.

Jan. 16-19. Winter Instrument-Automation Conference and Exhibit, Instrument Society of America, Sheraton-Jefferson Hotel and Kiel Auditorium, St. Louis, Mo.

Jan. 23-26. Plant Maintenance and Engineering Show, International Amphitheatre, Chicago, Ill.

Jan. 24-27. Society of Plastics Engineers, Annual Technical Conference, Shoreham and Park-Sheraton Hotels, Washington, D.C.

Feb. 7-9. The Society of the Plastics Industry, Inc., 16th Reinforced Plastics Division Conference, Edgewater Beach Hotel, Chicago, Ill.

Feb. 13-16. International Heating & Air-Conditioning Exposition and annual meeting of American Society of Heating, Refrigerating and Air-Conditioning Engineers, International Amphitheatre, Chicago, Ill.

Feb. 19-23. American Institute of Mechanical Engineers, Annual Meeting, St. Louis, Mo.

...Meetings and shows of interest to the chemical industries

Feb. 22-24. The Material Handling Institute, Pacific Coast Show, Cow Palace, San Francisco, Calif.

Feb. 26-*March* 1. American Institute of Chemical Engineers, Petrochemical and Refining Exposition and AIChE annual meeting, Municipal Auditorium, New Orleans, La.

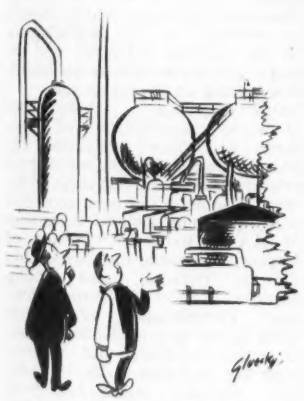
Mar. 13-17. National Association of Corrosion Engineers, Annual Conference, Statler Hotel, Buffalo, N.Y.

Mar. 20-24. American Society for Metals, 12th Western Metal Congress and Exposition, Pan-Pacific Auditorium, Los Angeles, Calif.

Mar. 21-30. American Chemical Society, National Meeting, St. Louis, Mo.

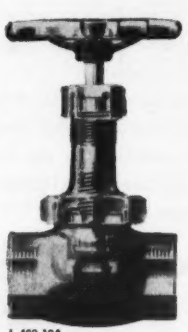
Mar. 27-31. Instrument Society of America, American Institute of Physics and National Bureau of Standards, National Symposium, "Temperature — Its Measurement and Control in Science and Industry," Veterans Memorial Auditorium, Columbus, Ohio.

Mar. 28-29. Commercial Chemical Development Association Meeting, Hotel Roosevelt, New York City.



"We built it exactly according to that sheet you tore from CHEMICAL PROCESSING!"

Perfect Pair to Put You Ahead of Competition



L-460-10A

Valve maintenance has been a costly problem in thousands of plants and buildings. Leakage, lost production, downtime, and maintenance make it hard to control costs. Now, patented Brinalloy® Seats and Discs, in Lunkenheimer LQ600 Bronze Globe Valves, are providing lowered costs that mean profitable, competitive operation. For a demonstration, contact your Lunkenheimer distributor, or write The Lunkenheimer Company, Cincinnati 14, Ohio.

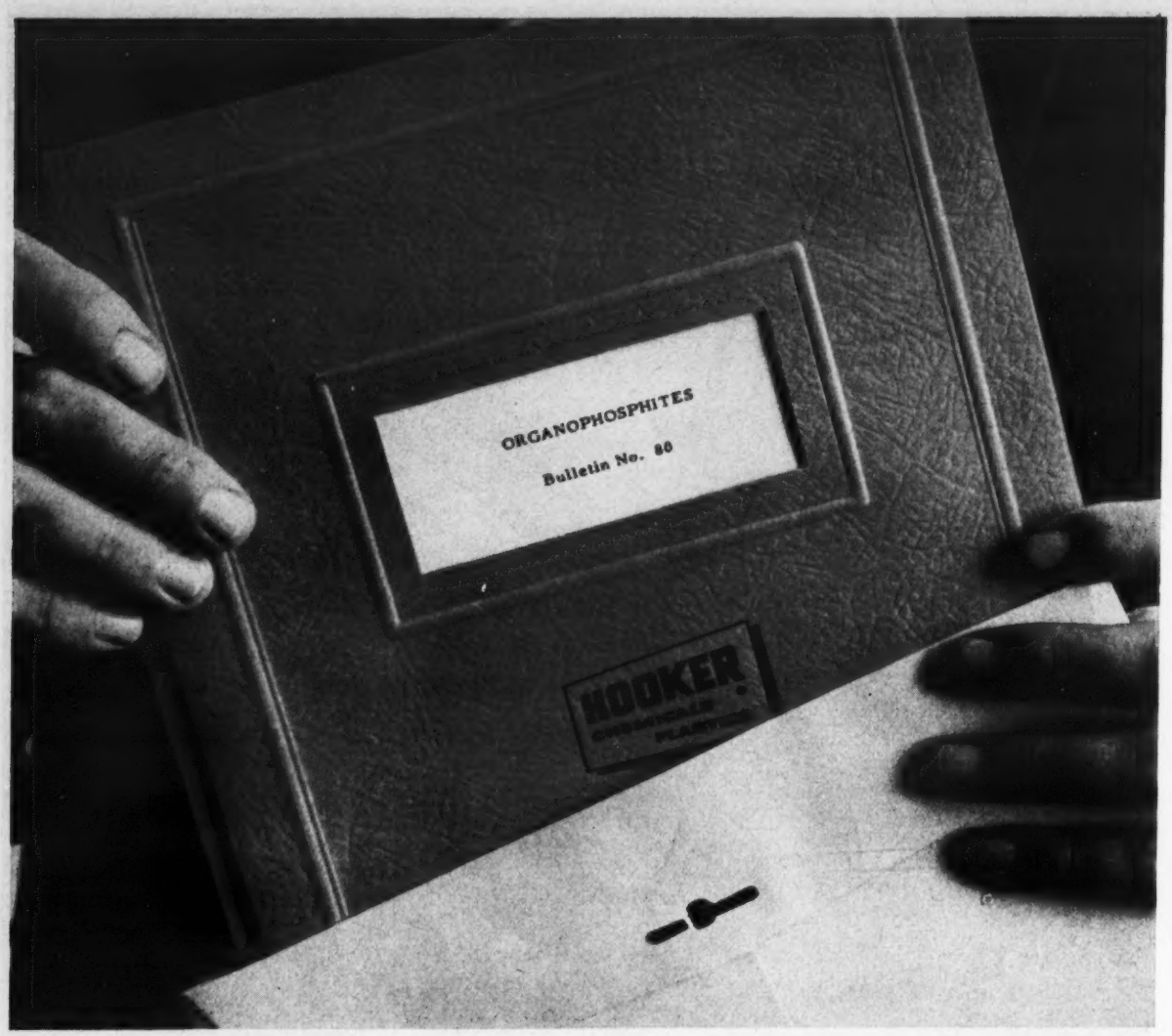
You Can't Find the *Cost* of a valve on a *Price* List

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

• BRONZE • IRON • STEEL • PVC

Check 1017 opposite last page.



$(C_6H_5O)_3P$ $(C_6H_5O)_2P-OC_{10}H_{21}$ $C_6H_5O-P(OC_{10}H_{21})_2$ $(C_{10}H_{21}O)_3P$

NEW ORGANOPHOSPHITES BULLETIN

If you've been looking for a handy reference on commercial organophosphites, write for a copy of this new bulletin on a family of four from Hooker.

The bulletin covers in detail triphenyl phosphite, diphenyldecyl phosphite, phenyldidecyl phosphite, and tridecyl phosphite.

Chemical properties and specifications, typical reactions are included in its contents. Applications in alkyd, vinyl, polyester, and epoxy resins and as stabilizers in other products are also discussed. It concludes with a two-page bibliography on the pertinent literature available.

All four of these organophosphites are now made in new facilities at our Niagara Falls plant. Increased volume and manufacturing economies have made possible the recent price reductions on the triphenyl and diphenyldecyl phosphites . . . Write for your copy of Bulletin 80 today.

HOOKER CHEMICAL CORPORATION
511 FORTY-SEVENTH STREET, NIAGARA FALLS, NEW YORK

HOOKER CHEMICALS PLASTICS

Sales offices: Buffalo, Chicago, Detroit, Los Angeles, New York, Niagara Falls, Philadelphia, Tacoma, Worcester, Mass. *In Canada:* Hooker Chemicals Limited, North Vancouver, B.C.

Check 1018 opposite last page.

recent books

Polyester resins, estimated to reach a 250-million-lb market level by 1965, are comprehensively treated by John R. Lawrence in a 252-page book. Historic background, chemistry, curing mechanisms and manufacturing as well as techniques used in processing the resins for use in reinforced plastics, casting and coating applications, are all covered. The appendix includes a tabulation of the basic characteristics of the standard resins manufactured by the major resin suppliers together with related reference material.

The present volume is the 15th of a series started in 1957 dealing with plastics applications. To obtain this volume on "Polyester Resins" remit $5.75 direct to Reinhold Publishing Corporation, 430 Park Ave., New York 22, N.Y.

Tables for Identification of Organic Compounds is a 240-page book published as a supplement to the "Handbook of Chemistry and Physics." The compact tables list in tabular form the derivatives of 4,380 parent compounds, arranged in 17 classes. All the derivative data are uniformly arranged according to melting point, crystal color and the solvent from which crystallize.

To obtain "Tables for Identification of Organic Compounds" remit $7.00 to The Chemical Rubber Publishing Company, Publications Division, 2310 Superior Ave., Cleveland 14, Ohio.

Check 1019 opposite last page.

"Polythene" is the second edition of this book dealing with the technology and uses of ethylene polymers. It contains over 780 pages, plus 93 pages of art, plates and numerous text illustrations. This book sets out the basic facts of all aspects of polythene production, properties, handling techniques and major uses in an authoritative appraisal which should be essential to all technologists in the plastics industries and in many industries where polythene is assuming an important role. Valuable appendices included table of world manufacturers of polythene and their production capacities and a list of world proprietary names for ethylene polymers. The book has been compiled with the joint general editorship of Archie Renfrew, Director of Imperial Chemical Industries, Ltd., Plastics Division, and Phillip Morgan, Editor of "British Plastics." Contributions of experts from Great Britain, United States, Germany, Holland and Switzerland are included in its 36 chapters. Authors' index has been added to the usual subject index.

To obtain "Polythene" remit $25.75 direct to Inter-Science Publishers, Inc., 250 Fifth Ave., New York 1, N.Y.

Check 1020 opposite last page.

THAT'S INTERESTING

Farming in caves

The farm of the future may be underground where lighting, temp, weather conditions, diseases and nutrition can be controlled accurately. Making this feasible is discovery that narrow bands of rays in light from incandescent bulbs and fluorescent lamps is responsible for most plant growth.

Sun heats hotel

Solar energy provides 80% of the hot water needed for radiators, water taps, cooking and other purposes at the Wilson hotel in Perpignan, France.

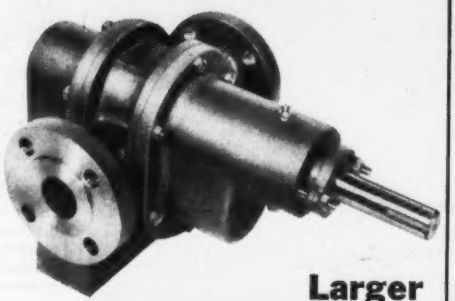
French scientists at Mont-Louis developed solar furnace and have perfected technique for storing "sun calories" of summer for use in winter.

For more information on product at right, specify 1021 see information request blank opposite last page.

ECO ENGINEERING NEWS

the big name in small pumps for the process industries

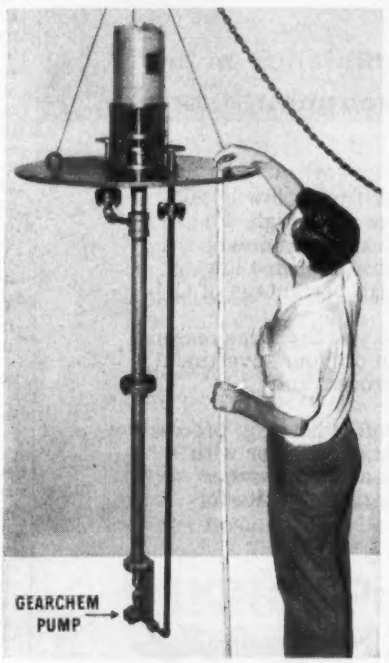
• New at ECO •



Larger GEARCHEM Pumps

Eco GEARCHEM Pumps, formerly made only in ⅜ in. and ¾ in. port sizes for capacities up to 3 gpm. and 10 gpm. respectively, are now available in the new 900 Series with 1½ in. ports and comparable higher capacities, greatly enlarging its range of service applications.

Two models are available; either with threaded ports or with integrally cast 150 lb. A.S.M.E. flanges, as illustrated.



SUBMERSED Pump

In such services as pumping out vessels under high vacuum, pumping high temperature materials, and pumping out of vacuum into atmosphere, this submersed GEARCHEM pumping unit eliminates problems of shaft seal leakage, heat-traced plumbing, low NPSH, etc.

Eco Pumps Serve Producers of Rare Biochemicals Used to Study the Chemistry of Life Itself

Schwarz Biochemicals and Radiochemicals are known and used by medical and biochemical institutes throughout the free world.

Products of Yeast

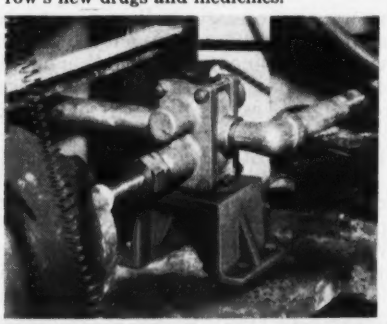
"About 20 years ago," states Mr. David R. Schwarz, President of Schwarz BioResearch, Inc., "we had the idea that biochemicals, produced by yeast, might be useful for investigation in biological and medical science, if we could learn how to extract and purify them economically. Our parent company, Schwarz Laboratories, Inc., with 80 years of experience as consultants to the brewing and food industry, furnished an ideal background for such a program.

Stimulated by Biological Research

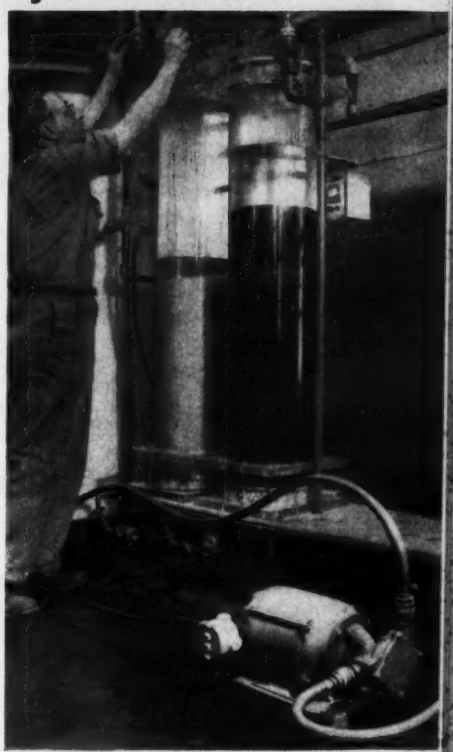
"The rapid expansion in biological research throughout the world greatly extended our original plans. Today the Schwarz price list includes 250 products extracted from natural sources or synthesized.

New Frontiers of Medicine

"These included both deoxyribonucleic and ribonucleic acids and their derivatives, of which Schwarz are leading or exclusive producers, as well as tritium-bearing compounds which have made possible entirely new types of investigation into the chemistry of nucleic acids and living cells. It is this research of today that leads to tomorrow's new drugs and medicines."



Eco GEARCHEM Gear Pump of 316 stainless steel with Teflon gears and bearings meters brewing water alkalinity corrective into 5 gallon containers at neighboring plant of Schwarz Laboratories, Inc. Metering is controlled by pump revolution counter and accuracy is maintained within ± 1%.



Eco CENTRI-CHEM Centrifugal Pump on portable skid alternates between several duties. Here it is pumping deionized water at Schwarz BioResearch, Inc.

Eco Pumps Serve Exacting Needs

Eco CENTRI-CHEM Centrifugal Pumps of Carpenter 20 stainless steel with Teflon and ceramic mechanical seals offer the ultimate in a chemically sterile, mechanically trouble-free pump. At Schwarz BioResearch, they are in such services as handling deionized water; pumping caustics (from the 3rd to the 5th floor of plant); recirculating slurries in scrubber of spray dryer, etc.

These CENTRI-CHEM pumps have been in service for periods of from 10 months to more than two years with negligible downtime for repairs.

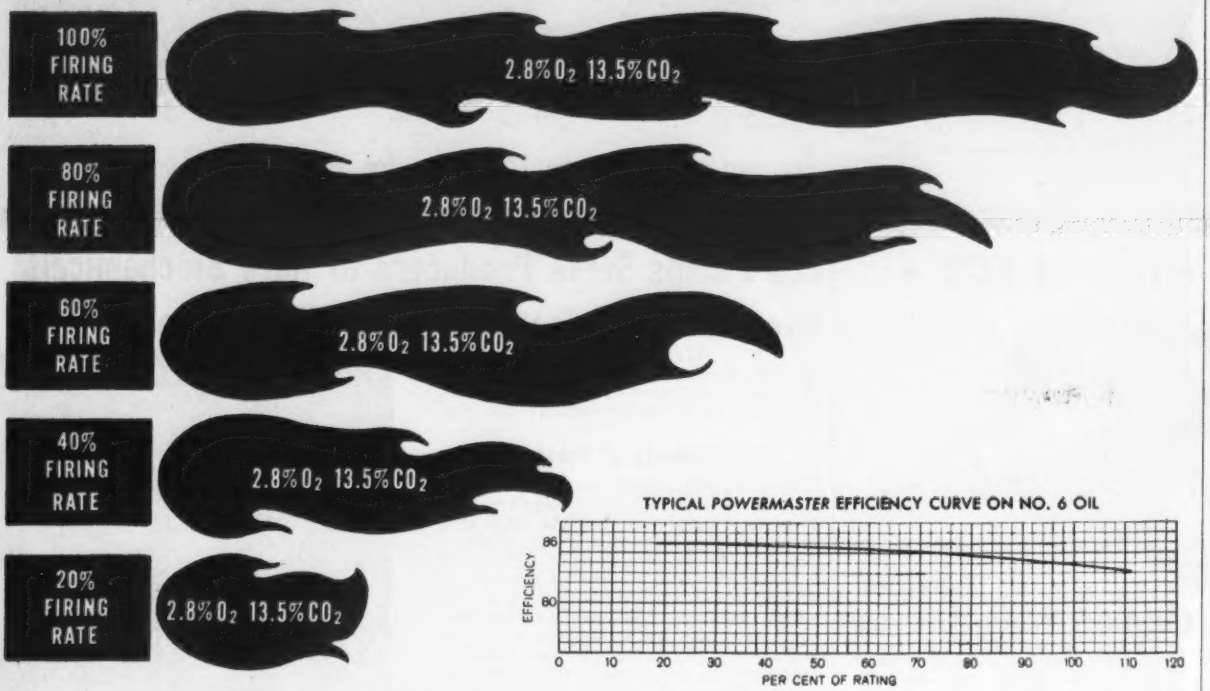
ECO Products for Handling Corrosive and Hazardous Processing Fluids

ALL-CHEM® Rotary Pumps
MINILAB® Rotary Pumps
GEARCHEM® Gear Pumps
CENTRI-CHEM® Centrifugal Pumps
PUMPMOBILE® Portable Pumping Units
GEAR-VAC® Valves
CHEMICAL DISPENSING VALVES
Factory Mutual Approved

Ask for literature on any or all of these ECO Products

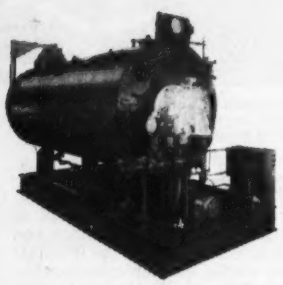
ECO ENGINEERING COMPANY · 12 New York Avenue · NEWARK 1, N.J.

FROM THE WORLD LEADER IN PACKAGED AUTOMATIC BOILERS AND BURNERS



Only *Powermaster*® gives you this type efficiency

Constant fuel-air ratio assures maximum efficiency at any load . . . cuts operating costs . . . returns investment faster



Whether you operate a *Powermaster* boiler from a low of 20% to a high of 100% of capacity, you get the same high constant efficiency. With O&S exclusive 5 to 1 turndown, fuel-air ratio is maintained at all loads with the same low percentage of excess air (2.8% O_2) and high percentage of CO_2 (13.5%).

This constant efficiency is important to you for three reasons: 1. Lower operating costs; 2. faster return on your investment; 3. more uniform heating, more uniform process and improved product quality.

Whether your requirements are for comfort heating, process or power, you'll pay for your boiler investment faster with an O&S *Powermaster*. For information on all *Powermaster* benefits, call your nearest O&S representative or write for Bulletin 1260.

75th Anniversary

ORR & SEMBOWER, INC.
960 Morgantown Road
Reading, Pa. • Since 1885

Powermaster®
PACKAGED AUTOMATIC BOILERS

Check 1022 opposite last page.

RECENT BOOKS

Safe-handling procedures for butyraldehydes (78) and formaldehyde (1) are subjects of two new chemical-safety data publications recently added to a series. Included is detailed information on properties, potential hazards, engineering-control of hazards, employee safety, fire-fighting, storage, tank and equipment cleaning and repair, waste disposal, medical management and first aid procedures. Safety Data Sheets 78 and 1 (revised) are available at 30¢ per copy from Manufacturing Chemists' Association Incorporated, 1825 Connecticut Ave., N.W., Washington 9, D.C.

Both animal and vegetable oils and fats are included in this second edition of H. G. Kirschenbauer's book. The 240-page volume discusses such subjects as autoxidation, rancidity, fat stabilizers, cholesterol in diet, selective hydrogenation, chromatography of lipids, and sequestering agents. Numerous tables, diagrams and illustrations amplify the text.

To obtain "Fats and Oils" second edition, remit $7.00 direct to Reinhold Publishing Corporation, 430 Park Ave., New York 22, N.Y.

Mechanical behavior of polymers in terms of molecular architecture and dynamics is outlined in this book by Arthur V. Tobolsky, Professor, Department of Chemistry, Princeton University. By using this approach, and by making use of the results of stress relaxation studies, Professor Tobolsky is able to reduce the complexities offered by the physical properties of polymers to easily understood analyzations. He was careful, however, to avoid oversimplification and at the same time also avoid excessive mathematical complexity. Most portions of the work can be read by the average graduate student or research worker in industry without undue difficulty.

To obtain "Properties and Structure of Polymers" remit $14.50 direct to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, New York.

Check 1023 opposite last page.

Sodium Chloride volume, edited by Dale W. Kaufmann, brings together all modern data on sources, production, properties and uses of salt and brines. With 19 specialists contributing to its 26 chapters, this work compiles the last information on salt heretofore scattered and relatively unavailable.

This book, designated as ACS Monograph No. 145, it is one of a series of works the first of which appeared in 1921. To obtain "Sodium Chloride" remit $20.00 direct to Reinhold Publishing Corporation, 430 Park Ave., New York 22, N.Y.

Glass . . . its manufacture, properties and applications is covered in 252-page book authored by Charles John Phillips of Rutgers University. Recent advances in the field are discussed. Information on glass bead reflectorization and "float glass" process for making flat glass are explained.

The book is directed to users rather than manufacturers of glass products. We recommend it as a good reference for engineers and scientists. Two appendixes are included. One lists common terms used for glass and glass products. Other is geographical index of American and Canadian glass factories.

To obtain "Glass — Its Industrial Applications" remit $6.95 direct to Reinhold Publishing Corp., 420 Park Avenue, New York 22, N. Y.

The seventh edition of the Merck Index of Chemicals and Drugs has been published. Index contains some 1600 pages of text covering nearly 10,000 descriptions of individual substances, more than 3300 structural formulas and about 30,000 names of chemicals and drugs. All are alphabetically arranged and cross-indexed.

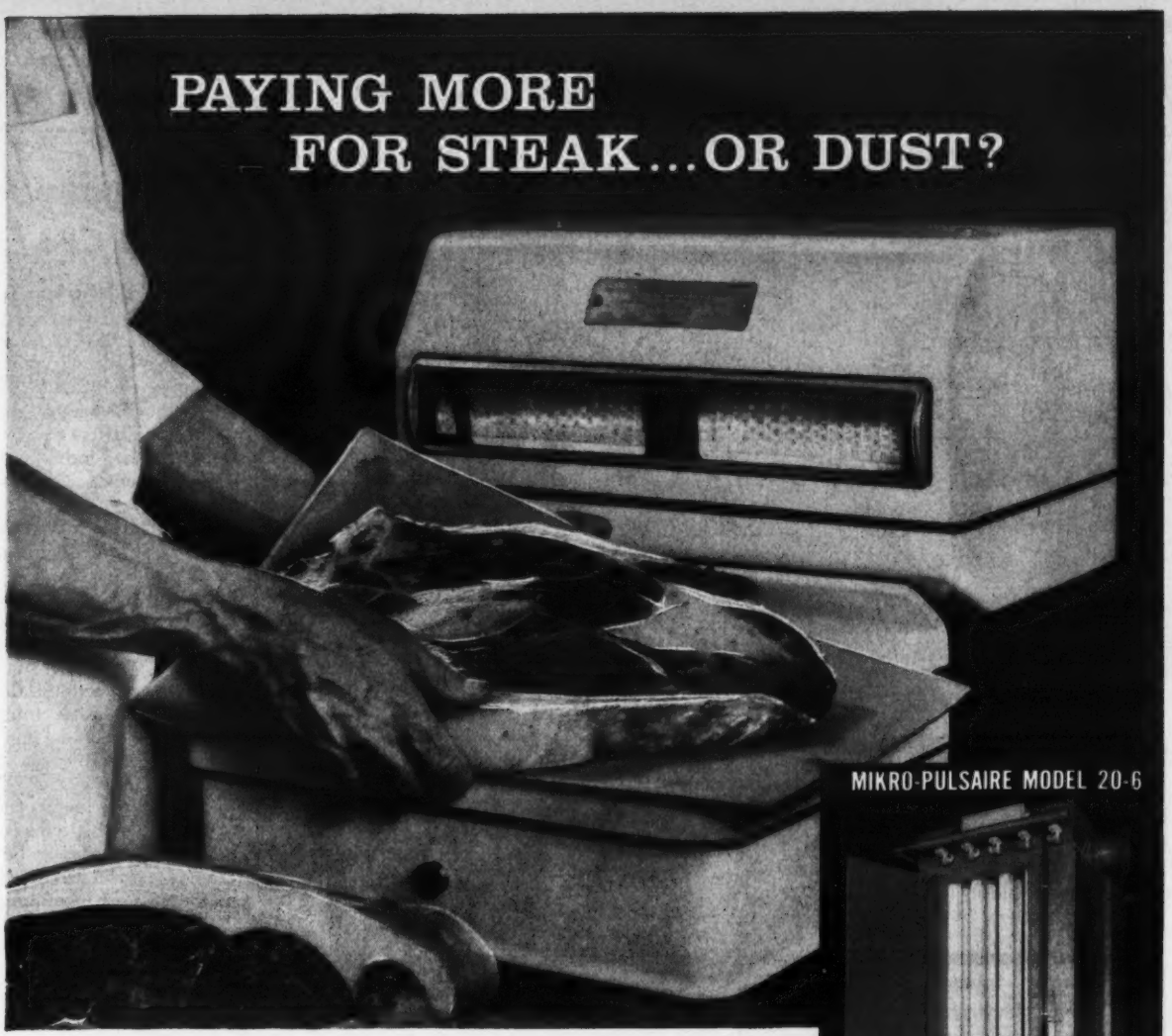
An outstanding feature of the seventh edition is a separate and greatly extended cross-index section of more than 30,000 names. This enables the user of the book to locate a particular chemical description by page number regardless whether he knows only the generic name, brand name or systematic chemical name for a substance. A special section lists more than 400 organic "name" reactions with original and review references, together with a description and structural representation of each reaction.

Published at cost as a professional service, the index is a widely used reference work among chemists, pharmacists, physicians, dentists, veterinarians, botanists and members of allied professions. To obtain "The Merck Index" remit $12.00 direct to publications Department, Merck & Co., Inc., Rahway, N.J.

Check 1025 opposite last page.

Four types of Acrylic Resins are described in 186-page book that explains raw materials and manufacture of these polymers in sufficient detail to establish an understanding of the problems involved in fabrication and application. The author, Milton B. Horn, covers the current and future developments of these polymers in terms of potential use in a great variety of products.

To obtain "Acrylic Resins" remit $4.50 direct to Reinhold Publishing Corporation, 430 Park Ave., New York 22, N.Y.



If your present dust control system is not delivering maximum efficiency, unchecked waste dust may be costing you more, on a pound for pound basis, than the finest cut of steak. Nuisance dust is a mighty expensive item when you consider its damaging effect on equipment, on employee morale, on general plant appearance and community relations. The most practical and economical solution of any nuisance dust problem is the MIKRO-PULSAIRE Collector, now available in new flexible modular units designed to meet any required capacity however large or small . . . attested recovery efficiency 99.9% plus . . . absolutely no moving parts, internally or in the gas stream . . . 4 or 5 times the capacity of conventional bag houses per unit of cloth area. For the toughest dust collection jobs – call on our engineering staff, and the MIKRO-PULSAIRE. Ask for Bulletin 52A-1.

MIKRO-Products
PULVERIZING MACHINERY COMPANY
60 Chatham Rd., Summit, N. J.
A Division of American-Marietta Company

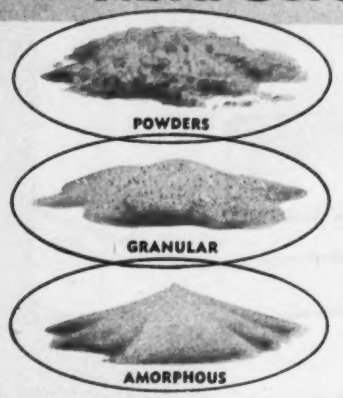
SPAN THE GLOBE

REPRESENTATIVES throughout the United States, Continental Europe, British Isles, Canada, Mexico, Central and South America, West Indies, South Africa, India, Japan, Philippines, Australia and New Zealand.
MANUFACTURING FACILITIES: United States, Canada, Continental Europe, British Isles.

Check 1026 opposite last page.

UNMATCHED ACCURACY... with

Vibra-Screw BULK FEEDERS



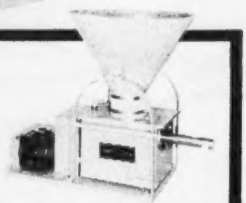
Minute by minute . . . hour by hour . . . VIBRA-SCREW Feeders precisely feed dry materials with unerring accuracy.

VIBRA-SCREW Bulk Feeders combine a vibrating screw rotation with a vibrating hopper, trough and tube. This exclusive new feature, offered in three styles, standard volumetric, feeder conveyor volumetric or gravimetric, now permits the positive handling of a wide range of different and difficult substances. Each VIBRA-SCREW unit is especially designed to meet specific feeding requirements.

Consider These Facts...

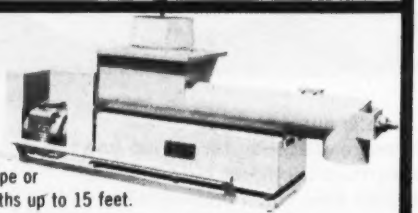
Standard Volumetric:

handles all materials, free flowing or sticky with complete accuracy. Capacity ranges from ounces to tons per hour.



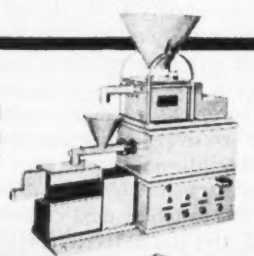
Feeder Conveyor Volumetric:

for heavy duty service. Feeds and conveys horizontally from supply pipe or hopper. Tonnage rates with screw lengths up to 15 feet.



Gravimetric:

delivers weighed batches directly into process at timed intervals. Handles quantities down to one ounce with variable frequencies up to 4 per minute. Intermittent charges are easily converted into a self-adjusting, continuous weight-controlled stream by using a continuously rotating and vibrating third screw.



Write Today **for more information and interesting literature including valuable engineering data. We invite your inquiries . . . just send us the details of your dry materials handling problem.**

Vibra-screw FEEDERS, INC.

156 Huron Avenue / Clifton, New Jersey

Check 1027 opposite last page.

Watching Washington

Military Requirements Challenge CPI Creativity

The element used to combat tooth decay may soup-up missile motors of the future — if the CPI meets one of the many challenges presented by the armed forces of today. Major General August Schomburg, chief of the Army's missile program, told an Armed Forces Chemical Association meeting here that a modified fluorine compound is showing promise in research to increase the thrust power of missile fuel.

Challenging the industry to come up with new missile propulsion systems, General Schomburg said: "If you want to do the really tough part of the rocket propellant business, go to work for the Army."

Explaining this, he told the group, "Our systems have to stand arctic temperatures and tropical heat. We need high thrust so we can reduce the weight and our missiles must withstand the rugged handling they get on all types of terrain."

The missile chief said the Army wanted propulsion systems priced "very much below $5.00 a pound, loaded." The General, whose command with headquarters at Redstone Arsenal, Alabama, is responsible for an annual expenditure of $1.8 billion, said the Army was "vitally interested" in cutting missile costs while improving performance and reliability.

The Army is also looking for storable liquid propellants. General Schomburg revealed that "considerable progress" is being made on a hybrid propulsion system. Such a system would combine the desirable reliability, handling and storage qualities of solid-propellant missile fuels with the more accurate thrust control of liquid rocket fuel.

Corrosion Is Still A Problem

Along with exciting new challenges there are also tired old problems — like corrosion of steel. Bringing the AFCA meeting back to earth for a while, Captain T. J. Fabik, assistant engineer-in-chief of the U.S. Coast Guard reminded the group that steel is and apparently will continue to be the major structural material for ships.

Speaking of corrosion, the Coast Guard spokesman said that the problem exists not only for ships but in the maintenance and upkeep of our buoys, and in portions of fixed structures such as sheet piling, wharf and pier structures. Many dollars in material and man-hours are spent annually in renewing the deteriorated structure itself. The expense is compounded, he added, when a whole unit or piece of machinery is inoperative during this overhaul period.

While acknowledging progress since World War II, Captain Fabik said there is still room for marked improvement and vast savings. Pointing to a related problem, he told the AFCA that marine organisms continue to plague ships. The "fouling" of ships' bottoms slows the ship and greatly increases fuel consumption. Progress has been made in this area, too, but the CPI still has to come up with a product with long lasting toxicity and one which is more economically applied than those now in use.

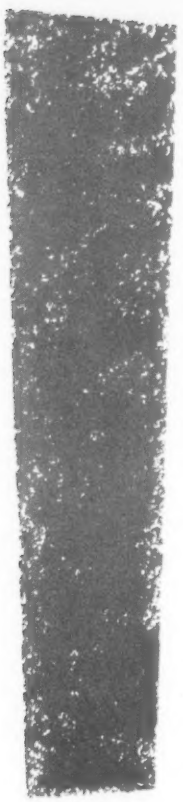
A second problem involving marine organisms is the treatment of wood to repel attack by the marine borer. Despite the use of creosote, the Coast Guard finds a high rate of deterioration in tropical and semitropical waters which requires constant expenditure of funds for pile replacement.

Substitution of other materials having a longer life, such as concrete or steel, is currently not economical. "Can we provide treating ma-

specialists in
STAINLESS
STEEL service
ESCO®
IINE WESTERN WAREHOUSES

YOUR MOST CONSCIENTIOUS SOURCE FOR

STAINLESS STEEL



YOU'LL LIKE doing business with *ESCO* representatives —for their job is to help you meet your stainless requirements. And, regardless of product or process, *ESCO* can supply everything you need in stainless; stock items, mill products and special castings.

YOU'LL LIKE the convenient stocks of stainless, whether it's sheet, plate, tube, pipe, bar, rod, wire, billet, valves, fittings, fastenings or PVC—the stainless steel of plastics.

YOU'LL LIKE the dispatch with which orders are handled and the promptness with which they are shipped from nearby warehouses.

YOU'LL LIKE *ESCO*'s complete laboratory facilities and metallurgical know-how that can help solve your special problems.

YOU'LL LIKE the *ESCO* research data and manufacturer's data that is available on stainless steel alloys.

YOU'LL LIKE calling your nearest *ESCO* warehouse:

CALL

ESCO®

LOS ANGELES 22, CALIFORNIA
6415 E. Corvette Street....RAymond 38601

SAN FRANCISCO BAY AREA
Emeryville 8, California,
1280 65th Street .....OLympic 4-2732

PORTLAND 10, OREGON
2141 N. W. 25th Avenue....CApitol 8-2141

EUGENE 4, OREGON
1464 W. 6th Street.....Diamond 3-2585

DENVER 7, COLORADO
3940 Grape Street.....FLorida 5-2349

SEATTLE 4, WASHINGTON
1131 W. Hanford Street.....MAin 3-4160

SPOKANE 13, WASHINGTON
N. 1327 Washington Street..FAirfax 5-4507

HONOLULU 5, HAWAII
630 South Queen Street..... 6-6186

ESCO LIMITED, VANCOUVER, B. C.
8425 Ontario Street .....ELgin 2288

terials or methods which will increase the service life of marine piling?", he asked. Counterpart of this on land is dry rot and termite infestation. Effective, easy and cheap means of protection or control are needed.

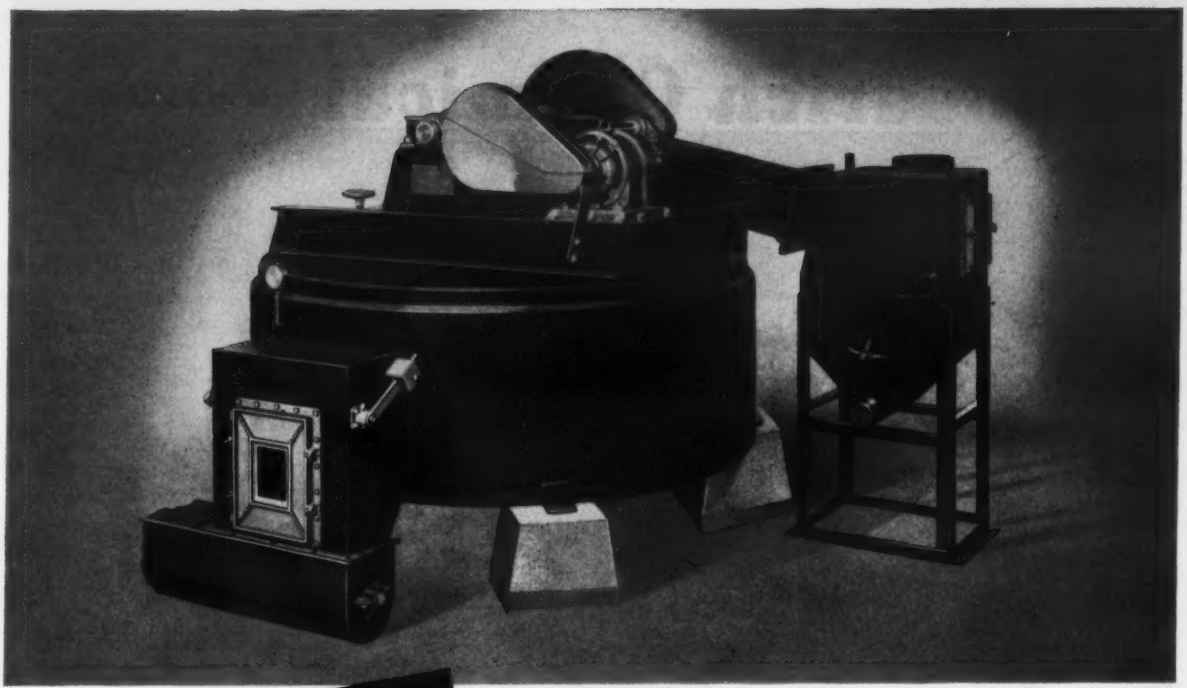
Other ways in which the CPI can help the Coast Guard (and for that matter, industry in general) include the following:

Coast Guard Has Many Needs

1) A "really satisfactory" and durable masonry plant to provide necessary color identification of light houses.
2) Longer lasting and sun-resistant fluorescent paints for planes.
3) For both exterior and interior aircraft use, paints resistant to erosion, fuel and oils; nontoxic in application; and removable with safe solvents.
4) Rubber and rubber-like materials and components with longer shelf life and less rapid rate of deterioration.
5) A special new type of rubber for aircraft propeller deicing boots.
6) Dependable long-life low-level power supplies for use in buoys and at isolated, unattended aids to navigation stations.
7) New developments in structural plastics which will permit an even greater use in boat and shipbuilding and perhaps in the structure of buoys and other aids to navigation. ("We have derived great benefit from developments in plastics," Capt. Fabik said.)

In conclusion the Coast Guard engineer told AFCA that he and other engineers can identify the problems and note the fact that a better material or method can be imagined.

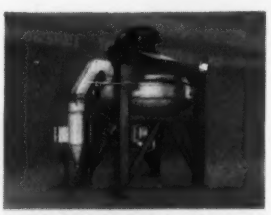
"It is only by close contact with the chemical industry, however, that such imagined things do not merely remain a dream. Often, you can produce the material or method



BARTLETT-SNOW
CLEVELAND 5, OHIO

BATCH DRYERS

Cutaway View of Standard Batch Dryer Showing Jacket and Sweep.



Special Stainless Steel Batch Dryer for Processing a Finely Divided Catalyst Without Dust Loss.

Dryers 6 ft., 8 ft. and 10 ft. in diameter with capacities of 1200, 3000 and 6000 lbs. per charge respectively are standard. Steam jacketed or direct fired. Atmosphere or vacuum processing. Also "Specials" to meet any unusual service requirement.

These Style A (atmosphere) and Style AV (vacuum) dryers are ideally suited for treating chemical salts, pigments, precipitates, activated carbon, filter cake, tankage and a wide variety of organic products. The charge is loaded through the top. An "S" shaped sweep agitates the material to assure uniform, thorough treatment, and discharges the dried material through the side outlet door.

Standard designs can be equipped for dust-tight discharge to a screw conveyor, and fitted with a vapor exhaust condenser to reclaim the fines, see view above. Variations from standard include those with dished bottoms, remote controlled discharge doors, and other ingenious arrangements to meet unusual service requirements. Let us work with you on your next project!

DESIGNERS
ENGINEERS
FABRICATORS
ERECTORS

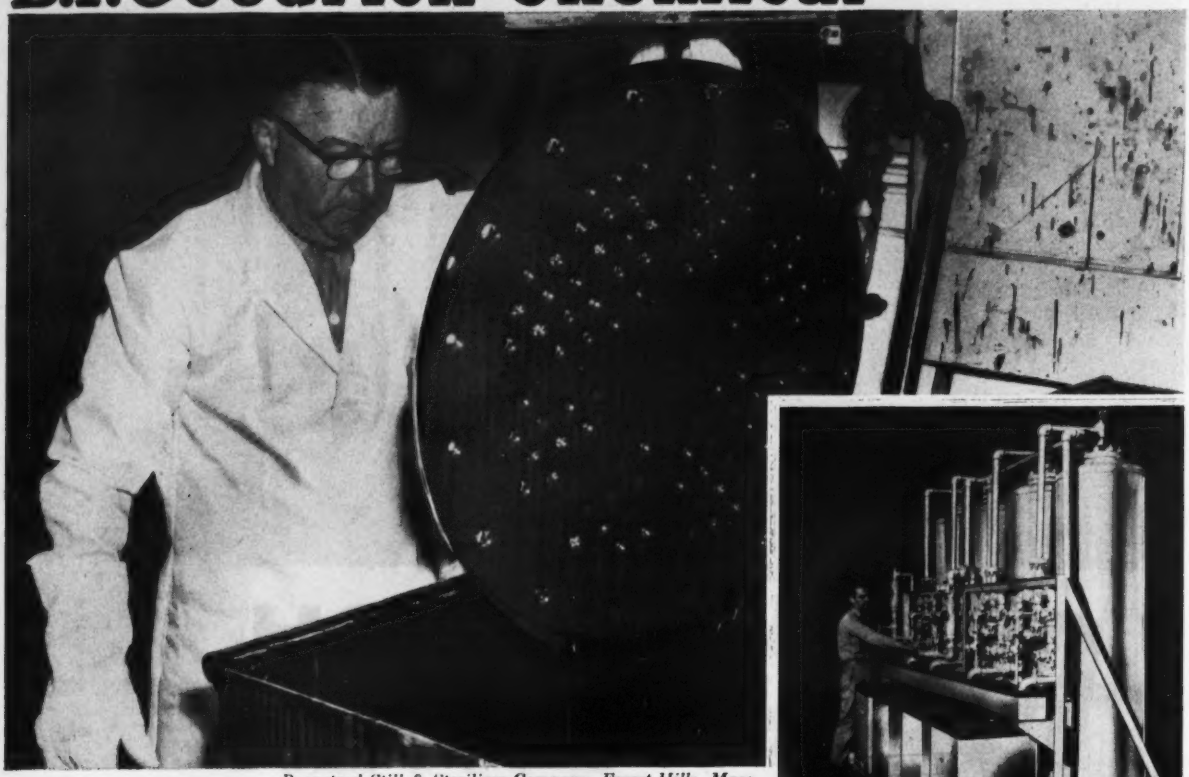
THE C. O. BARTLETT & SNOW CO.
6150 Harvard Ave., Cleveland 5, Ohio
DRYERS • COOLERS • CALCINERS • KILNS

Bulletin No. 118 gives full details. Send for a copy Today.

Check 1028 opposite last page.

News about

B.F.Goodrich Chemical *raw materials*



Barnstead Still & Sterilizer Company, Forest Hills, Mass., uses Geon coatings in demineralizer parts like the one shown here. Vinyl formulations, called Chem-o-sol®, are made using Geon by Chemical Products Corporation, East Providence, R.I. B.F.Goodrich Chemical Company provides the Geon vinyl.

Single dip of Geon plastisol insures corrosion-free demineralizer parts

Here's a real corrosion problem: the parts of a water demineralizer must never be exposed to the acid and alkali solutions used for regeneration of water. Such exposure would not only corrode and eventually cripple equipment, it would also allow entry of metallic contamination into pure water supply.

The solution is a simple dipping of pre-heated parts into a tank of plastisol made with Geon vinyl, followed by baking. The result is a thick, tough, corrosion-resistant shell which can withstand abrasion and shock.

The same manufacturer finds that using Geon for slush molding of demineralizer cartridges produces an excellent corrosion-free product. He reports that the plastisol is easy to work with, easy to mold and bake in his own equipment.

Here's a good example of ways Geon can improve your product. For more information, write Dept. GO-10, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Geon VINYLS

B. F. Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON vinyls • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

Check 1029 opposite last page.

we require. In fact, you have already repeatedly produced the ultimate solution. Frequently, we are preoccupied with immediate problems and remain unaware of the progress you have made."

Advanced Research Projects Agency

Dr. Gene V. Mock, assistant director of the Solid Propellant Office, Advanced Research Projects Agency, discussed four areas of chemical research in ARPA which account for a total of $41 million during fiscal 1961. Here the CPI will be called upon to supply good scientific talent or to aid in the production of new materials necessary to reach the goals the agency has set.

It's in one of these four areas — solid-propellant chemistry — that reliance is being placed mainly on the chemical industry for novel ideas for new fuels and oxidizers. The objective of this research program is to discover and demonstrate advanced solid propellants having useful energy at least 10% higher than existing ones.

"Such a jump requires a breakthrough of considerable magnitude," Dr. Mock said; "it requires the discovery of new chemicals not now on the shelves of laboratories." In setting up the program ARPA has contracted with a large number of industrial foundational and academic institutions.

Dr. Mock called AFCA's farsighted approach. Too often, he said, there are people who insist on detailed specifications for a research effort.

"We propose to give great freedom in definition of areas of research work. We are not working on a crash-type basis but wish to insure that these basic research programs will be continued over long periods of time, and to maintain and increase the quality of the highly trained staffs involved."

For an alert chemical industry there's business to be done in the 60's — new challenges to face and old problems to solve — as the armed forces look to the CPI.

PROCESS DYNAMICS

Something new in chemical processing is taking place to more effectively reduce costs, show way to increased capacity for least added capital. Cyanamid has launched process analysis program that may well set pace for industry . . . as

Drive for process improvement uses new specialist teams in "live" plant studies Part I

By JOHN MELLECKER

During the past several months big things have been happening at American Cyanamid. Behind the scenes a specialist task force, attacking the age-old problem of why process plants operate as they do, has been coming up with design and operating changes that have captured management's imagination and may well set a new pattern in process design and process-improvement practices.

A fermentation product recovery process has been improved to the cumulative saving of several hundred thousand dollars. An organic synthesis, which formerly turned out random-sized crystals requiring expensive reprocessing to meet market specifications, has been harnessed to directly synthesize crystals in exact needed size . . . saving no small sum. But the biggest departure into new fields of chemical engineering so far is the study of processing fundamentals of one of the company's major integrated plants.

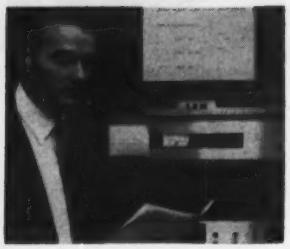
What is happening may not only significantly improve the firm's cost and profit performance (already the improvement trend of manufacturing costs is outstanding in the industry) — but is almost certain in the long run to have a profound effect on the way the chemical industry designs its future production facilities. What Cyanamid is doing in studying its plants is in itself exemplary. Moreover, Cyanamid is not only tackling the technical side of the picture — complex as it is — but is also meticulously covering the all-important human aspects.

The facts are simply that when one tackles process improvement on a radically modernized basis, he had better be prepared to fight out the issues involved with no holds barred. Empirical as today's designs may be, however, overheavy with extra capacity safety factors, they nevertheless work reasonably well and safely, and so are staunchly defended against ideas which as yet are "unproved." For good reason, too, as mistakes are costly, and must be prevented

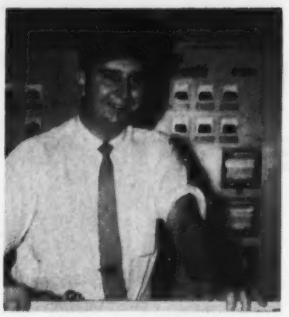
BENJAMIN, DRISCOLL & GROHSKOPF — Impetus for Cyanamid's process dynamics push

Drive for process improvement

From preceding page



GEORGE ARMSTRONG — Fortier '58: "I had worried about growing obsolete . . . the course has thrown me into a completely new world of people living, doing, demanding advanced engineering."



DR. R. M. YARRINGTON — Bound Brook '58: "I'm now able to complete dyestuffs process improvements in a month rather than a year. Processes are small batch, but need not be inefficient."

LEE OLSON — *Instructor:* "Greatest challenge to the new chemical engineering is measurement of the existing, 'live' processing plant."

where safety is involved.

Started 10 Years Ago

Unfortunately, "reasonably well" is increasingly not enough to satisfy present-day chemical industry's cost-jittery management. At Cyanamid, awareness that the need to try to find a more fundamental basis for improving processes and processing plants would be more pressing as time goes on, took root ten years ago.

It is more than a coincidence that the subject began to receive serious attention following the hiring of Herbert Grohskopf, a visionary chemical engineer with a heavily statistical background from Whitwell and Wilks (applied statistics) and from Wilhelm ("progressive" chemical engineering) influences at Princeton. "Herb's insistence that we couldn't possibly know the true potential of our processes or existing plants sounded revolutionary at first," recalls D. M. Benjamin, General Manager of Manufacturing Services — the staff unit responsible for support of manufacturing divisions, now including Grohskopf's Production Analysis Section.

"Gradually, however, many in management have become convinced that these ideas hold the best future for our company's efforts to remain competitive. Then too, production analysis is consistent with the newer concepts of over-all management now adopted by other leading corporations. These concepts call for similar analysis techniques to a wide variety of other company operations."

Recognition of production analysis has also been helped considerably by the fact that Dr. Hugh Hulburt, in charge of Physical Research and Engineering Research at Stamford Laboratories, is directing work along very similar lines.

Over the past decade there have grown into prominence in Cyanamid's production techniques re-evaluation arena, two men not only capable of visualizing production techniques and results *as they should be,* but also repeatedly demonstrating the ability to skillfully debate whether changes must take place . . . sometimes radical changes.

These men came into the picture from widely different backgrounds. One, E. D. Powers, Vice President Manufacturing, has had a long history of outstandingly successful cost reduction in various production roles — which has carried him to top management. From this vantage point he still exerts a strong influence over specific instances where better results may be expected, if sought diligently, and with imagination. The other is Grohskopf, who by 1953 had won Powers' serious attention, and ultimately his direct backing. This has grown into a now continuous demand for larger, more boldly challenging efforts along the new process improvement lines.

Step One: Central Staff

By 1956, Grohskopf had assembled a central staff which for its assigned role, production analysis (P-A), represented the variety of disciplines essential to comprehensive action. The team included a statistician, a mathematician versed in process "model" formulation, an engineer with unusual flair for hypothesizing full-scale plant systems, computer specialists, and another theoretical-minded chemical engineer.

Acting as consultants, these men learned their way around the company, fulfilling sufficient practical needs to "pay their way." But consulting role presumed that "clients" in operating divisions know how to make effective use of their specialized services. Such was not consistently the case, as the groundwork had not been laid in the divisions.

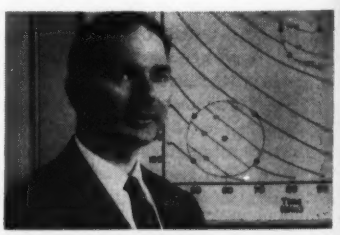
It was the recession of 1957 that actually aided the situation by causing Powers to take steps which were to have a profound effect on spreading and speeding up the application of the Grohskopf group's growing abilities.

Called for was decentralization of their activities into the operating divisions. This was consistent with the company's rapidly evolving general decentralization policies. In carrying out this mandate, the decision was made to retain the central core P-A group intact, but to immediately start a training program for unusually able process-improvement men from the divisions to serve as missionaries in their home plants.

Step Two: Training Field Staff

By May 1958, 16 chemists and chemical engineers with lively interest in process improvement, as well as above-average abilities in applied math, had been selected for training. They soon assembled at the Bound Brook plant for the first week of the four they were to so spend through that summer. Two weeks were to be spent back on the job between each week of training.

"We arrived at the four week figure," recalls chief instructor and general staff's chief statistician Jacob Horowitz, "by determining what material had to be covered. The heart of this material is usually covered in two years' graduate training, but I was sure, from my years



JACOB HOROWITZ — *Chief Instructor:* "We are convinced that accomplishment of process improvement will require intensive training and motivation of a large group of chemists and engineers of superior ability, at project leader level. Men who will go back to their plants and labs with new attitudes towards their work and new tools they can immediately use in making their work more effective."

Right — Irven Rinard demonstrates to 1960 class his development of computer math model for one of processes in Fortier plant

of continuing part-time teaching at Columbia University, that a select industrial group such as ours could absorb the whole picture in four hellishly concentrated weeks. Our judgment has subsequently been borne out."

The 1958 class heard lectures by such applied statistics greats as Box and Hunter (now of University of Wisconsin). But the job of inculcating new attitudes, teaching new approaches to production problems and solutions based on statistical planning and computer-aided calculation was accomplished only by insistent repetition by Horowitz and other participating central staffers. These men alternated between theory and practical examples of everyday use in the plant drawn from their own experiences around Cyanamid.

Internal Training Seen Best

The question of internal versus outside academic training for the men was decided in favor of the former, for reasons which might well strongly affect many similar cases to arise in the future. Well planned, rigorous internal training given by a central staff group intended to continue as a source of both stimulus and review for the post-trainee's career development can, according to Horowitz, have a profoundly lasting effect which would be almost totally lacking in the sabbatical leave academic solution to the problem.

Not that sabbaticals are out — the Production Analysis Section has two staff members currently on sabbatical leave, one at MIT and the other at the University of London — it is just that the internal training is to develop organization and the external is for developing particularly needed staff specialists.

About half the 1958 students were selected to be trained as plant specialists in process statistics, to aid and strengthen programs already under way. The others were expected to use advanced techniques in their work as development chemists and process engineers.

Results: '58 Class

What has happened? Some 1958 trainees have had outstanding successes in translating their new abilities into profit-makng process improvements. Others have been stymied, "by resistance to change inherent in some facets of any complex organization when engineering is involved," according to Benjamin.

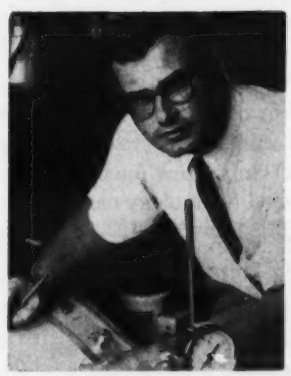
Happily, results so far have (1) more than paid the costs of the program, and (2) won broad attention within the company ranging from enthusiastic endorsement of the new techniques, to grudging admission that the results could have been gotten anyway but maybe not so soon.

"I sent one man to the 1958 course," comments one division manager. "By 1960, this fellow had brought about savings in one of our manufacturing operations that I'll wager has paid for the whole course as given to 16 men. This year, I sent two men to the 1960 course."

The 1960 course, completed in August, was given to 24 men, from research, product and process development, all chemists and chemical engineers. Two thirds had graduate degrees, one third had PhD's.

Alumni As Teachers

Two changes in the 1960 curriculum reflect maturing of the production analysis operation. This year, case-example presentations were given by the outstandingly successful graduates of 1958.

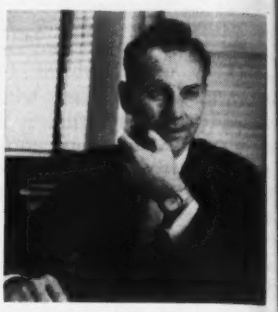


DR. DAN H. GOLD — Bound Brook '58: "Before, as a physical chemist, I took my problems to statisticians. Now I work directly with chemists who best understand a process, help them make decisions."

"This had two purposes," explains Horowitz. "Not only did the presence (as instructors) of these former students symbolize vast increase in ability and status resulting from the training and its perseverent application to practice, but also their presentations were even more plausible — coming from practitioners rather than us 'experts'."

The other change was to expose the students to the full-scale analytical recreation of a complex process—total plant simulation by computer techniques, and

based on what is probably the most thorough on-site study of the process dynamics of a "live" plant ever undertaken within the chemical industry.



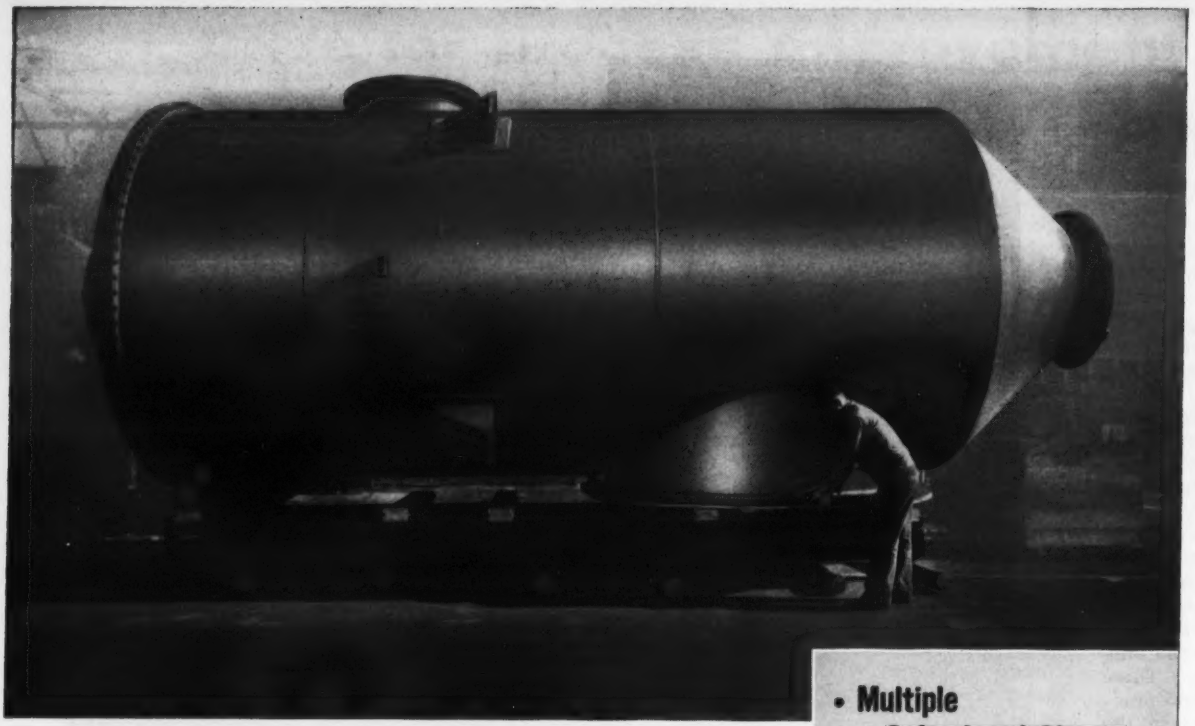
ELMER LIND — Lederle '58: "Now we're getting information we didn't realize we needed, using it effectively."

Other plant examples analyzed before the class demonstrated improvement in steady state performance in essentially *unchanged* production facilities. These included recovery of a fermentation product by solvent extraction*, an organic synthesis finally modified to directly product exact-sized product crystals (which do not "grow" after initial formation as crystals normally do).

NEXT MONTH, CP analyzes how Cyanamid capitalized on its intense process-analysis program in two specific examples of process improvement. You'll read about the step-by-step methods that were used, and how this new approach to process study in a "live" plant has paid off.

While these examples are more limited in scope than the full-scale plant study, "it is nevertheless this type of improvement that will month after month net the company a most important contribution to profit," comments D. M. Driscoll, manager of operations Engineering, and Grohskopf's supervisor. ■

* Lind, Elmer; Golden, J., & Hickman, J. B., "Fitting yield & cost response surfaces to a fermentation product refining procedure," pres. AIChE. Nat'l Mtg., Tulsa, Okla., Sept. 1960.



MANHATTAN RUBBER LINED TANKS for PERMANENT Protection against Corrosion and Contamination

Costly process equipment for storing and handling corrosives deserves the degree of protection possible only with specially compounded, acid-proof Manhattan Rubber Linings. Thick, multiple calendered sheets of natural or synthetic rubber assure maximum durability under rough working conditions. The linings expand and contract with the tank metal under temperature changes . . . won't harden or crack. Their protection against most acids and alkalis is as fool-proof as 65 years of advanced technology can provide.

All Manhattan Rubber Linings are bonded to metal so securely actual tests have proved they can't be separated! And every Manhattan lined tank is tested under high voltage to assure flawless protection before being shipped to your plant. If your equipment is too large to ship to Manhattan, skilled crews will do the job at your location.

Be *sure* of permanent protection for your process solutions and equipment. Let an R/M representative show you the advantages of Manhattan Rubber Lined tanks, pipe and process equipment. Contact the Manhattan Rubber Lining plant or sales office nearest you . . . or write direct.

- Multiple Calendered Sheets
- Permanent Protection Against Corrosion, Contamination
- Permanent Rubber-to-Metal Bond
- Resistant to Acids, Alkalis, Abrasion, Temperature
- Largest Facilities Longest Experience
- Rubber Lining Plants at Passaic, N. J. North Charleston, S. C.

Write for Catalog No. 7115

RM 1008

RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

RM

ENGINEERED RUBBER PRODUCTS . . . MORE USE PER DOLLAR

Check 1030 opposite last page.

U.S. industry rushes overseas to build chemical plants

With more than 1¾ billion dollars already invested in foreign plants, American chemical manufacturers are increasingly going abroad to:

- **Be closer to mass markets in Europe and Japan**
- **Overcome tariff barriers and trade restrictions**
- **Take advantage of faster growth rate abroad**
- **Profit from more favorable tax situation**
- **Have ready access to raw materials**
- **Benefit from lower labor rates**

By **GORDON WEYERMULLER,** Associate Editor, Chemical Business

U. S. CHEMICAL PLANTS ABROAD*

—location of 190 foreign facilities indicates expansion pattern

Country	No. Plants
Canada	38
England	22
France	17
Argentina	13
Australia	11
Brazil	10
Mexico	7
Italy	7
Japan	7
Holland	7
West Germany	7
Colombia	6
Venezuela	4
Belgium	4
Puerto Rico	3
Sweden	3
South Africa	3
Spain	3
Cuba	2
India	2
Greece	1
Austria	1
China (Hong Kong)	1
New Zealand	1
Norway	1
Philippines	1
Portugal	1
Switzerland	1
Trinidad	1
Chili	1
Peru	1

* Includes both partially and wholly owned plants

Despite Castro and his policy of "intervening," U.S. chemical companies are surging to countries outside the continental United States to build plants and take advantage of a combination of favorable circumstances. American chemical producers already have more than 1¾ billion dollars invested in foreign plants, more than twice as much as five years ago.

Currently more than two hundred million dollars per year is being spent for overseas plants, and the volume of foreign investment is steadily increasing.

American chemical companies have built plants in more than 30 foreign countries. The accompanying table shows the location of 190 of these chemical plants. Note the popularity of Australia, a country with a relatively small population. Mexico, too, seems to be a favorite despite the former expropriation policy.

What are these favorable circumstances causing a stampede to build abroad? One of the most important factors is the advent of the Common Market in Europe, along with that of the Outer Seven. The Common Market countries alone represent a booming economy of 160 million people, close to the same population as the United States. Hence, by locating plants there, an American chemical company can greatly increase its sales and improve its profits.

England and countries such as Sweden also present similar opportunities for marketing in Europe. Japan represents another rapidly growing economy, with a greatly in-

Du Pont's neoprene plant at Maydown in Northern Ireland started production in May 1960

U.S. chemical plants overseas *From page 33*

creased market for chemicals.

Of course, these countries have been good export markets for U. S. chemicals and we will continue to export large volumes of chemicals. However, in many cases where tariff barriers or trade restrictions are hampering marketing, the answer is to build a chemical plant in the country concerned. Quite often it is a 50/50 partnership with a foreign company or whatever other arrangement seems to be best.

In spite of the vigorous economies in Europe and Japan, these areas have a long way to go to catch up to the United States in production. For this reason, their growth rate is faster than that of the U. S. at present. They represent a new frontier for American chemical companies. This is even more true for the largely undeveloped countries in South America and Asia.

Many foreign countries are furnishing various incentives for American companies to locate plants in their countries. One of these is to provide a tax advantage. The corporation tax rate in the United States is high: 52%. In some other countries taxes can be deferred. Puerto Rico, with its "Operation Bootstrap," eliminates taxes for ten years on plants that locate there.

Ireland has a similar plan, eliminating taxes for several years on new plants. The Boggs bill, which has been before Congress, would tax only the income brought into the United States from foreign investments and not the portion reinvested.

On September 14 President Eisenhower signed a bill sponsored by Rep. Machrowicz which reduces income taxes of some corporations operating abroad. Legislation provides that companies can consolidate their foreign earnings for tax purposes. For example, if a company pays 60% income tax in one country, the additional 8% can be used as a credit against U. S. taxes on income earned in another country where the levy may be less than 52%. American corporations subject to such variable income taxes on foreign plants will save $20 to $40 million per year with the new law.

In addition to getting a better tax break and skirting high tariffs, U. S. companies are locating abroad in specific areas where they have ready access to raw materials, water and transportation. Many petrochemical plants have been located near petroleum refineries or in areas where natural gas was readily available as a raw material. One company built a large plant in Canada for this reason.

Another advantage is the generally lower labor rates in foreign countries. However, labor rates are rising in such countries as West Germany and this advantage is not as pronounced as formerly.

With respect to disadvantages,* the first one that usually comes to mind is the possibility of expropriation. Past experience shows that this is not as great a threat as it might seem from reading the current headlines about the Cuban situation.

The U. S. Government provides a form of insurance against expropriation or loss due to war to minimize risk to companies and to encourage foreign investment. This ICA (International Cooperation Administration) investment guarantee is available for plants located in 34 countries. Cost to companies building abroad is nominal.

Each company has its own reason for building overseas. Discussion of foreign investments and international policies of a number of individual companies provides information for those in other companies who are interested in building plants overseas.

◀ Yokkaichi plant of Mitsubishi Monsanto Chemical Company Limited. Plant produces polyvinyl chloride compound and films as well as plasticizers

*Among other disadvantages of building abroad are difficulty in maintaining control of plant, diversion of resources, language and customs, and political problems. See article, page 23, August 1960 CHEMICAL PROCESSING

Dow Builds Plants To Maintain Growth Rate

Dow Chemical is currently spending about $25 million per year in foreign investments. Acording to Leland I. Doan, Dow president, one of main reasons for going overseas is to keep up the company's growth rate. During the past 40 years, the company, on the average, has doubled sales every five years.

Mr. Doan says, "All right! If we can't grow that fast here anymore, we'll put some plants in England and France and Italy and India and South America and Australia and some other places — and see if we can keep up the pace that way."

Another reason Dow is going overseas is to make it easier to justify research projects. For example, if the 160 million people in the European Common Market are added to the 180 million in the U.S., potential return on research is much greater than if the U. S. were considered alone.

Mr. Doan also states, "We find that on the whole, the percentage of net return on invested capital is considerably better in foreign countries than it is in the United States."

Dow has been active in Canada for many years. One of the first moves to another country was in the formation of Asahi-Dow in Japan. Asahi contributed most of the money and Dow contributed its process and know-how for the production of saran. Later, styrene and polystyrene production facilities were built in Japan.

During the last two or three years, more moves of this nature have been made so that Dow now has 11 foreign plants in eight countries. More will undoubtedly be built soon.

Aggressive Foreign Program Undertaken by Hercules

One of the companies that recently started an ambitious program of building plants abroad to be closer to markets is Hercules Powder Company.

To next page

U.S. chemical plants overseas *From preceding page*

Prior to 1960, Hercules had seven wholly owned or partially owned overseas plants. Since the first of the year, company has announced plans for building three additional plants in Australia, Sweden and The Netherlands. These plants will produce rosin derivatives for the paper, protective coatings and synthetic rubber industries. The Australian plant is a joint venture, while the other two are wholly owned.

The 10 overseas plants of Hercules represent investments in 7 foreign countries. A vigorous survey is underway to determine the advisability of further investments in other countries.

Allied Chemical Moves Abroad

Allied Chemical Corporation is another company which has not had much capital invested abroad but is starting an active overseas building program. The company feels that it can capitalize on foreign opportunities. Allied favors the 50/50 ownership arrangement.

Typical of overseas plants planned is one to be built in Australia to manufacture nylon tire cord, monofilament and molding compounds. It is a joint venture with Polymer Corporation Limited. Allied has four chemical plants in Canada for producing sulfuric acid, aluminum sulfate and fluoride chemicals.

Monsanto Most International In Chemicals

Monsanto has been called the most international of the chemical companies in chemicals, with interests in 28 plants in 11 foreign countries. The company acquired its first foreign plant in England in 1920. Recently the company has expanded its foreign investment greatly. At the end of 1959, Monsanto had $228 million in gross assets abroad, compared to $72 million in 1953.

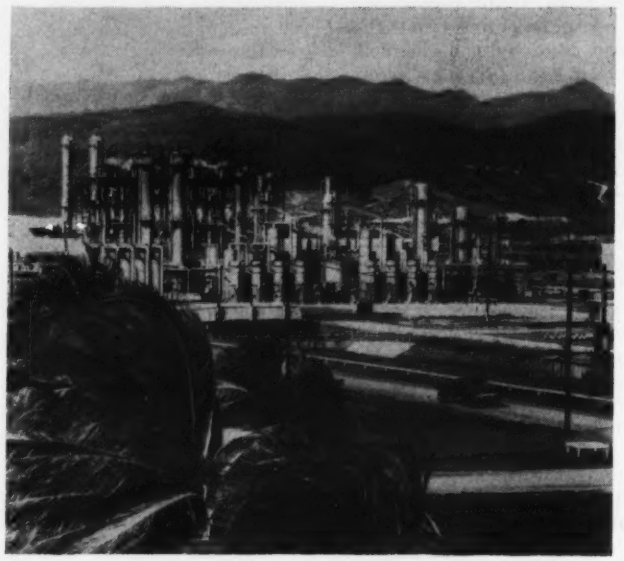
According to Ed Seaton, assistant general manager of the Overseas Division, the company considers all of its operations on a global basis. Mr. Seaton says, "When a new plant is being planned, we do not just think of whether we should locate it in Texas or New Jersey, but also consider whether it might best be in West Germany, Japan or elsewhere."

In deciding on a possible plant abroad, Monsanto has a check list of 20 pages long on economic situation, political and social climate, as well as the market evaluation and other factors. In 40 years of building plants in many different countries, Monsanto has not lost any assets by expropriation or similar methods.

Basic reason for the company going abroad is the opportunity offered for a good return on investment when all of the factors are suitable to build a plant. Profit is certainly one incentive, but Monsanto hopes its efforts are also contributing to world peace and improving the economic conditions of people in other countries.

The company has equities that go from 2 up to 100%. Relationship can become quite complicated. For example, Monsanto Chemicals Limited in England, in which Monsanto owns a 66 2/3% interest, and Monsanto Chemical Company (U.S.A.) jointly own Monsanto Chemicals (Australia) of Melbourne.

As an indication of the company's rapid expansion abroad, Monsanto has teamed up this year with three overseas partners to form new companies in Belgium, Spain and Australia.



Ethylene glycol is principal product of Union Carbide's plant at Ponce in Puerto Rico. Puerto Rico's "Operation Bootstrap," eliminating taxes for 10 years in plants that locate there, has encouraged American companies to build plants on the island

Du Pont Foreign Investments Rise Rapidly

Du Pont believes that one way to meet the rising world competition is to build abroad. Formation of the Outer Seven and the Common Market makes it possible to build sizable plants to serve large markets, according to company president, Crawford Greenewalt. An example is the recently opened plant at Maydown in Northern Ireland, with a capacity of 50 million lb of neoprene per year.

Du Pont now has $50 million invested in Europe. Five years ago it had no direct investment in Europe. In Canada, the company has an operating investment of $119 million, which can be compared to $79 million five years ago. Company also has substantial investments in Latin America. Overall investment there has not changed radically in the past five years.

All of their European subsidiaries are fully owned with the exception of a German partnership in which Du Pont has a 26% interest. Du Pont of Canada Limited is 81.5% owned by the parent company. In Latin America, all subsidiaries are majority or wholly owned with the exception of a company in Mexico in which Du Pont has a 49% interest.

Du Pont now has 22 overseas plants in 10 countries. Total foreign business in 1959, including that done by nonconsolidated foreign subsidiary companies, amounted to $300 million. Of this total, $115 million represented sale of products made outside the United States.

Reichhold Has More Plants Abroad Than in U. S.

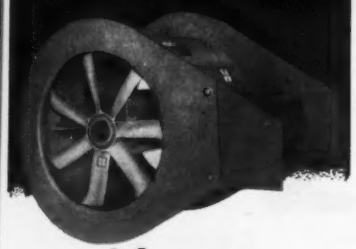
Reichhold Chemicals, Inc. began a policy of establishing foreign affiliates as far back as the early 1930's. So strong is the company's international outlook that it now has more affiliated foreign plants than U.S. plants: 29 vs 24. The 29 are located in 23 foreign countries. Among the products manufactured are a broad range of synthetic resins for surface coatings, adhesives, and plastic applications as well as such basic chemicals as phthalic anhydride, maleic anhydride, formaldehyde and phenol.

Celanese Serves World From Canadian Plant

Celanese has a petrochemical plant at Edmonton, Canada, which is one of the principal world suppliers of pentaerythritol. The United States is the principal customer for this chemical, some 25% of plant's output being sold here. Some 13% is used in Canada and the remainder is exported to about 30 countries.

Prime reason Celanese located this plant at Edmonton was the abundant oil and

combat
CORROSION
the modern
way . . .



with new
Aerovent
FIBER GLASS
DUCT FANS

Featuring a unique built-in orifice and tear-drop shaped belt housing, Aerovent *Fiber Glass* Duct Fans are designed for your "*problem*" ventilating requirements. Virtually unaffected by normal concentrations of corrosion and most forms of chemical attack, *fiber glass* – used in the construction of the fan housing and other internal surfaces – assures longer, more dependable service in even the most difficult applications.

Propellers are stainless steel or Dura–a special alloy created by Aerovent for better resistance to corrosive atmospheres. Available in 17 models in sizes 14" to 42" for capacities to 32,500 cfm.

write for bulletin 175

All deliveries of all Aerovent equipment are tested and rated in accordance with established and accepted codes and each unit is guaranteed by the manufacturers to deliver its rated performance.

CERTIFIED PERFORMANCE

Aerovent
Aerovent
FAN COMPANY, INC.
Ash and Burr Streets Piqua, Ohio

Check 1031 opposite last page.

natural gas resources in that area. Large quantities of butane and propane serve as raw materials for the company's direct oxidation process. In addition to pentaerythritol, the plant produces a variety of other chemicals, such as formaldehyde, menthanol, acetone and acetic acid. Total investment at this location is $75 million.

Celanese affiliates now have plants in four countries and the Corporation is associated with manufacturing operations in two other countries. These foreign plants produce high-grade pulps, fibers and plastics, as well as chemicals. It is expected that foreign interest of company will continue to grow as additional opportunities arise.

Cyanamid Expects Both Exports, Foreign Production to Grow

E. G. Hesse, Managing Director of Cyanamid International, has pointed out that now about 40% of his company's products sold abroad are made in foreign plants, with remainder produced in the U. S. and exported. Within 3 years it is expected that 60% of total overseas sales will be made abroad as more foreign plants are built.

However, this does not mean that company's chemical exports will decrease in volume, but rather it is expected that they will continue to increase. Although exports will drop from 60% to 40%, the 40% will represent a larger volume than the 60%, due to steadily increasing foreign activity. This same trend has been predicted by some other chemical companies.

Add $7.5 Million Investments During 1960

Cyanamid International coordinates the operation of seven wholly owned production facilities abroad, two plants in which it holds majority interests, two plants owned jointly, and several in which company is a minority stockholder. Cyanamid expects to add $7.5 million investments during 1960.

To page 88

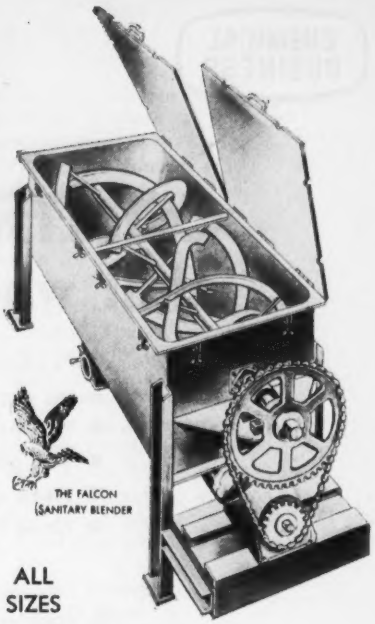
The FALCON
RIBBON BLENDER
"the TOP-FLIGHT Mixer"

- POWER
- PRODUCTION
- PRICE

FEATURES . . .

- *All Welded Construction*
- *Mild Steel or Stainless*
- *Approved Sanitary Design*
- *All Rounded Corners Thruout*
- *Quickly Demounted for Cleaning*
- *Extra Heavy Shafts and Ribbons*
- *Leak Proof-Dust Tight Outlet*
- *All Sizes Usually in Stock*

MANY REPEAT ORDERS FROM PLANTS NOW USING FALCON MIXERS



ALL SIZES

SEND FOR ILLUSTRATED BROCHURE

The FALCON MANUFACTURING DIV. of
The FIRST MACHINERY CORP.
209-289 TENTH ST., BKLYN. 15, N. Y. ST. 8-4672

Check 1032 opposite last page.

We bet millions on our couplings

When you buy a Fast's coupling, you can bet your bottom dollar everything was built on the spot, not assembled piece by piece from other suppliers. Koppers multi-million dollar manufacturing facilities are the most modern in the industry . . . with advanced program machines, highly accurate gear shapers, a complete forge shop.

For example, all Fast's Couplings are jig-drilled and jig-reamed for greater interchangeability of parts. Result: you get high-quality, smooth-running, long-lived units that are the choice of more equipment manufacturers than any other gear-type coupling.
KOPPERS COMPANY, INC., 1711 Scott Street, Baltimore 3, Md.

KOPPERS

FAST'S COUPLINGS
Engineered Products Sold with Service

Check 1033 opposite last page.

CHEMICAL BUSINESS

CONTRACT MAINTENANCE

. . . skill when and where you need it

CM's rapid growth and extensive use in some areas suggest you should consider it if you:

- **Are expanding a plant**
- **Are planning a new plant**
- **Have excessive maintenance costs**
- **Have fluctuating maintenance requirements**

By **GORDON WEYERMULLER,** Associate Editor, Chemical Business

Contract maintenance — defined as an arrangement whereby a portion or nearly all of a plant's maintenance work is done by a professional maintenance contractor — is increasing rapidly in the CPI. According to best estimates, CM has increased three to four times, as measured in manhours, over what it was five years ago. Increase has been due to additional plants under contract. In the Houston area, for example, practically all new chemical processing plants are considering CM in their scheme of organization.

Principal advantage of contract maintenance is brought out by statement of Burton E. Cash, plant manager of Celanese Polymer Company's polyethylene plant at Deer Park, Texas, which uses CM: "Our main purpose in having contract maintenance is that it permits us to regulate the size of the crew commensurate with the work to be done. It is not necessary for us to hire and lay off people as the work load changes or, conversely, have idle people on the payroll."

Maintenance force furnished by contractor for the Celanese plant varies from 25 to 100 men, depending upon day-to-day requirements. Number can be varied with only a few days notice. Labor problems are handled by the contractor and not by the industrial relations group at the plant. According to Mr. Cash, contract maintenance has provided a definite savings at his plant.

This Celanese plant is one of the 10 chemical processing plants in the Houston area being handled by Brown & Root, Inc., one of the two engineering firms probably doing more contract maintenance than any others in the field. The other firm is Catalytic Construction Company, Philadelphia, which is currently serving 20 chemical processing plants in the United States and Canada. During 1959 Catalytic expended in excess of two million manhours on contract maintenance.

Applied Most Easily To New Plant

It is easiest to start contract maintenance in a new plant when it first goes on stream. Second easiest way is when an addition to a plant is being made and a larger maintenance crew will be required. It is difficult to change over to contract maintenance in an established plant, considering employee relations and moral obligations as well as legal and union problems. It has been done, however.

The plant that can use CM most advantageously is one that has widely variable maintenance requirements. This is why it has been used in the refinery field for many years for turnarounds requiring several hundred men for short periods. (Incidentally, a number of chemical plants are considering this turnaround technique, where complete facilities are shut down periodically for preventive and corrective maintenance.)

The larger, continuously operated chemical plants, similar in nature to petroleum refineries, can use the flexibility of contract maintenance to advantage. Some of these highly instrumented plants need nearly as many men for maintenance as they do to operate the plant, which makes maintenance a very important factor in costs.

Ability of a plant to adjust its maintenance crew to fluctuating requirements is a big advantage in starting up a new plant. Usually startup problems are encountered and more maintenance men are needed at first than later. If these men are on the permanent payroll it is sometimes not easy to release them.

With CM, a plant never needs to keep more maintenance men on the payroll than actually needed. Also, if less total people are on the payroll, fewer office personnel are required to handle labor problems and supervise maintenance. Employee benefit programs, insurance, taxes and accounting are all simplified.

Contract maintenance has intangible advantages such as the "right to manage." If the contractor does not perform as expected, his contract can be terminated. If the plant finds that an individual mechanic is not doing the work satisfactorily for any reason, it is a simple matter to change him through the contractor for a different and better person.

CM Not Favored By Some Companies

Despite its rapid growth in recent years, some companies are still unsympathetic to contract maintenance. A number of the major chemical companies either do not use it at all or use it only to a limited extent. Reasons for not swinging over to contract maintenance vary.

Typical CPI Plants Using Contract Maintenance

(Contractor does over 90% of maintenance unless otherwise specified*)

Contractor — Brown & Root

Company	Location	Products
Celanese Polymer Co.	Deer Park, Texas	Polyethylene
Champion Paper & Fibre Co.*	Pasadena, Texas	Paper Products
Diamond Alkali Co.*	Deer Park, Texas	Chlorine, Caustic, Chlorinated Organics
Reichhold Chemicals, Inc.	Houston, Texas	Resins
Signal Oil & Gas Co.*	Houston, Texas	BTX
Stauffer Chemical Co.*	Houston, Texas	Sulfuric Acid
Tenn-Tex Alloy & Chemical Corp.*	Houston, Texas	Steel Additives
Texas Alkyls, Inc.	Houston, Texas	Aluminum Alkyls
Union Carbide Chemicals Co.*	Seadrift, Texas	Polyethylene, Ethylene Oxide
U. S. Industrial Chemicals Co.	Deer Park, Texas	Polyethylene

Contractor — Catalytic Construction

Company	Location	Products
Cyanamid of Canada	Hamilton, Ontario, Canada	Ammonia, Urea
British American Oil Co.	Port Moody, B.C., Canada	Petroleum Products
Ethyl Corporation of Canada, Ltd.	Corunna, Ontario, Canada	TEL
Firestone Tire & Rubber Co.*	Orange, Texas	Butadiene
Goodyear Tire & Rubber Co.	Apple Grove, W. Va.	Resins
Standard Oil Co. (Ohio)*	Toledo, Ohio	Petroleum Products
Stauffer Chemical Co.	Delaware City, Del.	Carbon Bisulfide
Sun Oil Co., Ltd.	Sarnia, Ontario, Canada	Petroleum Products
Tidewater Oil Co.	Delaware City, Del.	Petroleum Products

*For the companies designated with asterisks, contractor does 25% to 50% of maintenance except Standard Oil (Ohio), where contractor furnishes supplemental maintenance and Firestone Tire & Rubber, where contractor handles turnaround maintenance.

Some feel that the high employee morale in plants with good maintenance management is difficult to obtain with CM. Experience gained by long service of a regular employee is not easy to match. A responsible maintenance employee comes to think of specific equipment as though it were his own and maintains it to the best of his ability.

Others believe that contract maintenance may only be a substitute for poorly managed maintenance. Then too, it may be more expensive than developing an efficient force of plant employees. It is certainly of less advantage in a plant where maintenance requirements remain at a fairly stable level.

Although contracts can be varied in many ways to suit the requirements of an individual plant, they can be classified into a few basic types. Type providing most potential savings to a plant is one in which the basic responsibility for maintenance is vested with the contractor. He maintains a permanent force in plant to supervise and do the maintenance, supplemented by additional men in peak periods. Plant retains only a few maintenance people of its own for specific jobs and to coordinate requirements of management with contractor.

A second type is that in which the contractor has a permanent force on plant supplementing the regular maintenance organization. Since contractor does only a portion of maintenance, overall supervision is usually retained by plant.

A third contract is that in which the contractor merely supplies supervisory personnel and hires the maintenance men locally. This type is often used for turnaround maintenance in the refinery field. In this case, contract is only for the peak period of the turnaround.

An example of how a contract can be varied is shown by the one at the Celanese plant in Deer Park. Here the contractor also supplies labor for bagging and warehouse work. This was included since in these areas the load is variable and CM permits the addition or subtraction of labor as desired.

At Celanese the plant furnishes the tools used for maintenance. In most of plants maintained by Catalytic Construction, the contractor furnishes the tools.

Type of contract depends to some extent on location of plant and contractor selected. For example, in the Houston area, Brown and Root has several thousand skilled men regularly employed, a portion of which are available for contract maintenance. From this labor pool, contract maintenance work is done for the 10 chemical processing plants in the vicinity of Houston (see accompanying table).

One reason the Celanese Deer Park plant selected Brown & Root to do its contract maintenance was the contractor's past history of satisfactory labor relations. The caliber of people that would be placed in the plant was a major consideration. Ability of contractor to supply large numbers of dependable people on short notice also was a factor governing choice. Of course, wage rates, fees and scope of contract entered into decision.

Turnaround Accomplished In 48 Hours

An example of what Brown & Root can accomplish is shown by the instance of a local refinery that was coming up for shutdown. Because of commitments for the output of the plant, it was imperative that the turnaround be accomplished in 48 hours and over a weekend. Contractor put nearly 500 men on the job working around the clock Saturday and Sunday. Plant was back in operation on Monday morning.

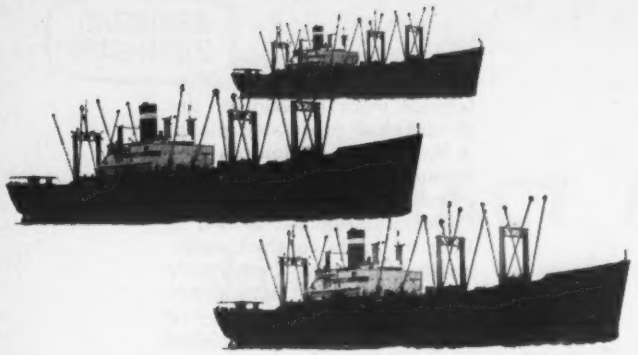
Sometimes Brown & Root undertakes contract maintenance for a plant or an addition they have designed and constructed. Some of the maintenance people who had a hand in the construction are left behind to maintain plant. Hence, they are intimately acquainted with the plant.

Catalytic Construction Company has about 1500 men employed on contract maintenance work. These men work in much the same way as regular plant employees except that they are only there when work is necessary to be done

To page 183

Coming

Continuing CP's coverage of contract maintenance, a future article will describe CM in the field of instrumentation and control.



CHEMICAL BUSINESS

Imports Threaten Manufacturers of Organic Chemicals

Dissension and double-talk cloud tariff picture as industry struggles for Government recognition of its problems

By **JOHN MELLECKER**, Editor-New York

THE U.S. synthetic organic chemical industry — makers of such widely varied materials as saccharine and synthetic resins — is in a state of nerves over foreign trade developments soon to come to a head at the GATT* Conference in Geneva.

Perhaps the biggest problem the industry has is that of getting recognition of the varied interests — and needs — of its more than 670 member firms.

Talk to one manufacturer — a big one — and chances are he'll say his company is doing all right both here and abroad, and things look as though they'll stay that way as long as plenty of opportunity is given the foreign countries (where his plants are located) to reciprocate and sell some of their products in the U.S. He may be thinking of making organic chemicals in the foreign countries and sending other things — steel, hardware, tools, radios, and the like, into the U.S.

On the other hand, talk to another organic producer — this time a small one — and a distinctly different theme is heard. He is among the 150-plus small firms of which not over 10 of the largest have annual sales of more than one million dollars a year; with not more than another 100 having sales of $100 thousand.

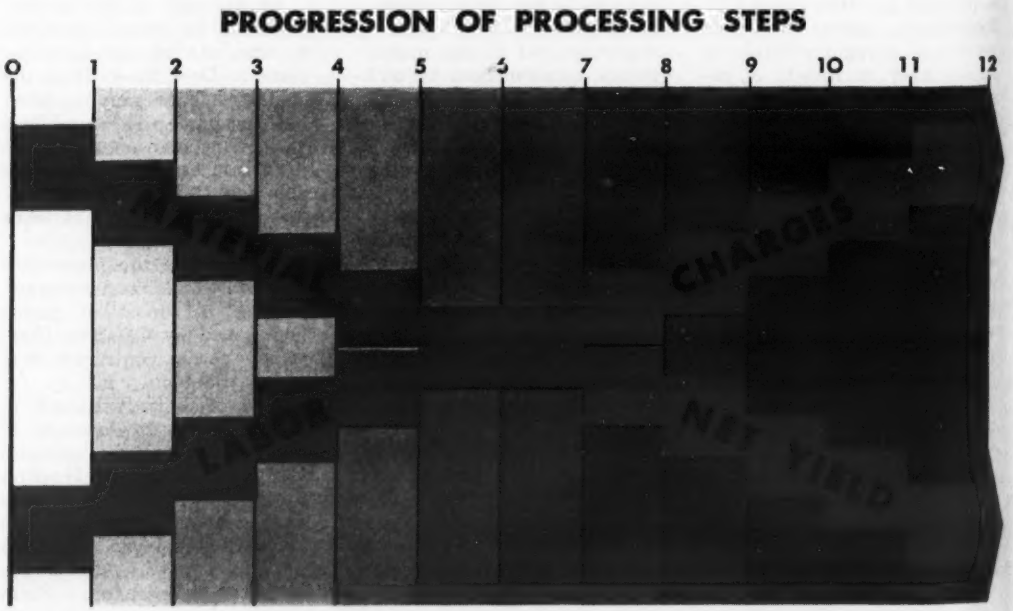
His firm doesn't have manufacturing facilities abroad, nor does he any longer have left any export business — this having been taken care of by the resurgence of rebuilt foreign synthetic organic chemicals industry.

What he depends upon is the relatively small capacity (batch) production of his products, carried on by well-paid, highly skilled workers.

Chances are, he'll tell you that all too often, imports from low labor cost countries permitted under our tariff rules can in almost every case undersell him — and sometimes come too close for comfort towards putting him out of business!

Actually, the smaller manufacturers don't like to be specifically identified with their troubles — publicly. "We're a small, publicly owned company that has succeded in

* GATT — General Agreements on Tariff & Trade, subscribed to by the six European Common Market countries, plus 21 others.



The larger the number of batch processing steps required for producing an organic fine chemical, the more the yield losses and cumulative labor costs that have to be charged against the dwindling quantity of product.

fighting its way along with increasing sales . . . doing pretty well . . . don't want to cause the investing public to lose confidence in our ability to keep our heads above water," says a typical small producer.

On the other hand, small company representatives have recently appeared before the Tariff Commission and submitted confidential statements detailing what has happened in specific cases where imports have literally knocked the markets out from under their firms.

Even the bigger firms suffer somewhat from similar entry of products which undersell. With them, however, the item frequently continues to be carried into the marketplace, but at either little or no profit, or at a loss. Result: Reduced profitability of over-all company operation. Big company executives responsible for such operations often tend to speak like the small company operator.

The trouble is, so many organic chemical reactions are of a chain nature — there's no way to prevent formation of an isomer or secondary products of reaction. They form and keep coming out of the reactor and separation column — no matter what the market situation.

Cleve's acid is an example. Make it and you get not only one, but two products: the 1-6 and 1-7 isomers. Over the years, the demand has occasionally been in balance with production, but usually one or the other is hard to dispose of profitably. Currently 1-7 is in good demand. Getting rid of the 1-6 is a serious problem, however, as imports of very low priced 1-6 have reached the level of normal total U.S. consumption. So this lays upon the doorstep of the U.S. producer not only the inability to sell his 1-6 at anywhere near what he has in it, but he thus has to carry its share of the labor and materials costs and overhead in the pricing of his 1-7 isomer. In addition, this provides an open hunting license for those who may see also fit to import the 1-7.

"You can be sure of one thing," says one producer, "the foreign operators can undersell us in the U.S. anytime they have the extra material to ship into the country."

Why? Visualize that anywhere up to 12 separate processing steps may have to be undertaken to bring into being one of the more complex dyes or intermediates. Each step may entail quite an involved operation in its own right. Take the example of making nitrobenzene. Starting with purified benzene, it is reacted with nitric acid. Then the product has to be washed free of the acid, and in turn the wash water must be neutralized before disposal into a stream. After such washing, the product is purified by distillation — four operations in one step.

Costwise, each major step adds not only labor charges, but also extra-materials charges (such as for the neutralizer, above). Then one must add to the product cost the basic material losses incurred with each processing step, because with organic reactions one rarely gets 100% yield. Actually, it is usual to lose from 5 to 20% of the primary material, each time a reaction takes place.

"Start with a hundred lb of benzene," comments one production man, "and you're lucky to end up with ten lb of product from a 12 step series, figured on the basis of original benzene equivalency." Then too, as processing progresses, stepwise units of cost have to be applied to decreasing quantities of material — making the unit cost higher as a function of the number of steps involved.

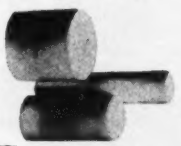
Some Profit from Imports

But if all is not rosy, some aspects of the industry are decidedly so. Many firms benefit from imports of foreign-produced raw materials and intermediates. "A good profit game today," reports one veteran, "is to buy from foreign sources an intermediate representing almost all the steps required for making some valued product. You bring it

SEARCHING FOR SHAPES OF TEFLON?

Here they are . . . by Doré

SHEETS:
Thickness: 1/32" thru 2"



RODS:
Extruded: .200" to 6" dia.

TUBES:
Molded: 2" O.D. to 30" O.D.
Extruded: ¼" I.D. to 2½" I.D.
½" O.D. to 4" OD..

Sheets, rods, tubes, tape, solid and envelope gaskets, bellows, expansion joints, "O" rings, Vee packing and scores of other shapes of TEFLON* are produced by Doré under the most rigid quality controls. Many exclusive and patented operations are utilized to assure uniform density, freedom of pin holes, dimensional accuracy, and absence of internal stress in TEFLON shapes by Doré. Most of these items are also available in Doré FLUOROGREEN.

Regardless of what your TEFLON requirements may be you will get the best in service . . . the utmost in quality . . . the maximum in performance when you specify shapes of TEFLON by Doré. Write for latest bulletins and data sheets on TEFLON and FLUOROGREEN products by Doré or for engineering assistance on any special problem or application you may have.

*Registered trademark for Du Pont fluorocarbon resins.

John L. Doré Co.
5406 Schuler • P. O. Box 7772 • Houston 7, Texas
Export: 1505 Race St. Philadelphia 2, Pa. U. S. A.
Cable address: Dorex

Du Pont
TEFLON
Doré
FLUOROGREEN®
Fluorogreen is a John L. Doré Co. Reg. Trademark

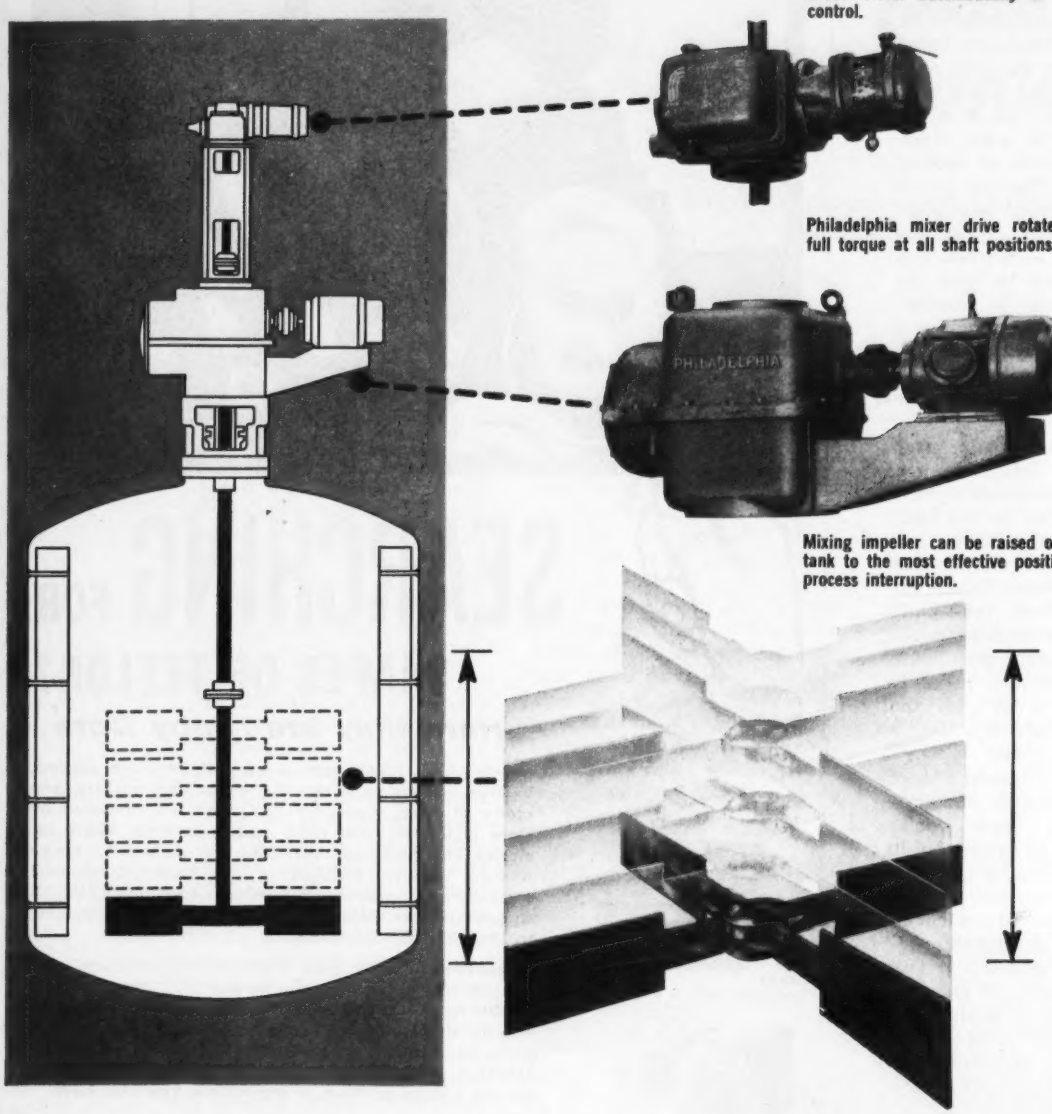
Check 1034 opposite last page.

NOW...you can raise and lower mixing impellers with no process interruption...

Philadelphia Limitorque raises and lowers mixer shaft—either automatically or by push button control.

Philadelphia mixer drive rotates shaft—applies full torque at all shaft positions.

Mixing impeller can be raised or lowered in the tank to the most effective position . . . with no process interruption.



This combination of Philadelphia Mixer power transmission components gives you optimum mixer performance at all times. Mixing can continue at full tank pressure while impeller position is changed, and there is no danger of product contamination because it can be done without opening the tank.

Many processors are already taking advantage of this unusual mixer design feature. Why not learn how Philadelphia lifting-lowering mixers can improve the effectiveness of your mixing operations. For full information, send for Bulletin LL-60.

philadelphia mixers / PHILADELPHIA GEAR CORPORATION
King of Prussia (Suburban Philadelphia), Penna.

Check 1035 opposite last page.

into this country and convert it here with the high cost labor operation. By this means, you're using low cost labor on the maximum number of reaction steps. One other advantage is, you can honestly claim the product is 'produced in the U.S.A.'"

"That's just fine," comments another in the business "if you don't have plant facilities you may have to abandon, or a competitor of the foreign firm that you may knock out of the market . . ."

Another aspect of manufacturing abroad has to do with the facilities built by major U.S. chemical companies abroad. Using the lower cost labor of these countries, the plants will turn out product competitive with local conditions, and intended for growing regional markets.

"But just let us get squeezed out of the business at home by cheap imports and we'll start playing the same game ourselves — importing our own foreign-produced product back into the U.S. under the same rules that admit the other fellows' products," cautions one big company executive.

That this would represent a power squeeze on the small producer, is of little doubt. Such might be all that is needed to tighten up on capital available for expansion to a degree beyond that experienced at times in the past. "More than once," recalls a successful small operator, "we've been turned down in our attempts to get capital for what appeared to be reasonable ventures, but for which we were unsuccessful in getting assurances for our investors of protection from lower priced imports."

"Why take a chance," the investors said. Yet, sulfa drugs, isocyanates for polyurethane foams, and any number of other important contributions have been made possible through the timely mobility and drive of the smaller organic synthesists — who have had the imagination to see a good thing and the freedom of action to plunge into action while the chances were still

To page 85

CREATIVITY & SURVIVAL

This article continues the series inaugurated in October with the article, "Is Creativity Lacking in Industrial Chemical Research?" Recognizing the need for a more basic approach to research, a number of chemical companies are taking positive steps to do something about it. Here we report some of these activities

How industrial chemical research organizes for creative drive

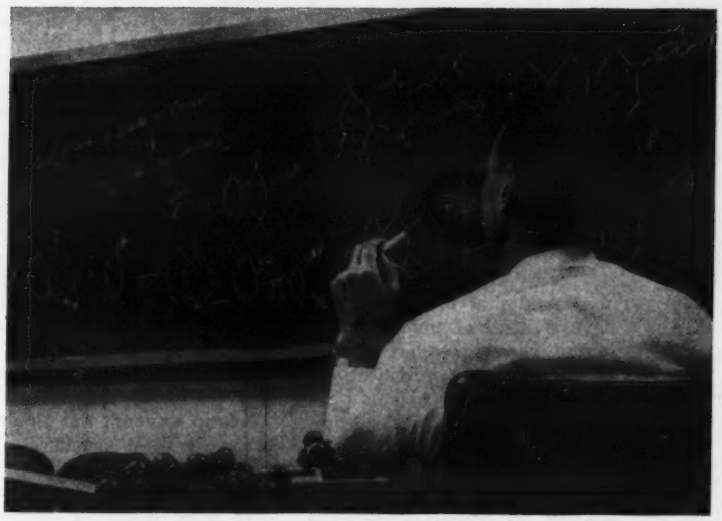
By **GORDON WEYERMULLER,** Associate Editor, Chemical Business

Dr. C. A. Hochwalt, Monsanto's vice president in charge of research recently said, "I hope to see the day when a topnotch, creative bench chemist here at Monsanto will be making more money than the president of the company." Of course, Dr. Hochwalt was speaking of the company's "Scientist and Technologist Program" through which chemists and engineers need not go into management in order to advance, but can use their creative talents to maximum advantage in research.

This is one of a number of steps taken by Monsanto to foster a higher degree of creativity in research. Dr. Hochwalt says, "There is a need for us to become more basic in order to compete. The company that makes a breakthrough has a tremendous advantage."

In order to stimulate creativity, Dr. Hochwalt believes in allowing a good deal of autonomy among the various research departments so that individual ideas on advancing creativity can be tried out. One research leader who has used this opportunity to advantage is Erwin Somogyi, who until recently directed the activities of 125 people engaged in inorganic research at Monsanto. He now heads Monsanto's Research & Engineering Division.

Mr. Somogyi believes in a flexible organization that can adapt itself to the varying individuals insofar as possible. Hence, report-writing procedures, charging of time to various projects, and working rules are informal and flexible. Every technical employee has a key to the inorganic research building and can come in and work in the middle of the night or on weekends as he chooses. Mr. Somogyi believes in the flat-type of organization with few levels and opportunity for free interchange of ideas.



Chemist pondering chemical equations illustrates Du Pont research, which starts with the study of basic scientific problems

Basic Research Faster, More Economical

As for the approach to research, Mr. Somogyi is a strong advocate of the basic method and believes it is usually faster and more economical than empirical methods. He cites an air pollution problem in which the empirical method of trying different things failed. By approaching the problem in a fundamental way, Monsanto solved the problem. In addition, basic knowledge on particle size, glass fibers and stack design was acquired which has been successfully used for 54 other applications in the company.

Being a major producer of calcium phosphates, Monsanto found that it had to develop more basic knowledge on them in order to compete successfully. Accordingly, the company spent a great deal of money developing fundamental information on phosphorus. However, the money was well spent. A comprehensive book has been published on phosphorus, and Monsanto has the reputation of being one of the

Research organizes for creative drive

From preceding page

Monsanto laboratory devoted exclusively to basic research in Zurich, Switzerland. Total facilities occupy some 10,000 sq ft

outstanding authorities in the world on this subject.

Monsanto spent $26.9 million for research, development, patent work, and basic engineering in 1959. Based on parent company sales of $615 million, 4.4% of sales was spent on research. About 10% of total research expenditure was for basic research.

In 1927 Du Pont initiated a broad program of fundamental research. At that time company said that it did not believe that all of the basic research should be left to the universities and institutions other than industry. This philosophy is still a guiding principle in company's research program.

In 1959 Du Pont spent $90 million on research, 4.2% of total sales. About $14.5 million of this was spent on fundamental research. Using the fundamental or basic approach has paid off for company many times in added profits and spectacular accomplishments.

One recent scientific breakthrough achieved in Du Pont's fundamental research work opens the door to understanding a major life process. For the first time researchers duplicated the reaction nature uses within a living cell to create the nitrogen compounds without which no life can exist. An understanding of this vital biological process is expected to answer many significant questions about the chemistry used by nature. It could have important applications in agriculture and food technology.

These are just some examples of what some companies are doing to stimulate creativity in industrial chemical research. Certainly, there are other companies, both large and small, that are doing some interesting things to foster creativity.

Basic Approach Not Limited To Large Companies

Some have said that only the large chemical companies can afford to do basic research. However, the smaller companies have sometimes found their salvation in a broad research program with a fundamental approach.

For example, Foote Mineral is now completing a $2 million research center, designed to accommodate 175 scientists and engineers. Foote certainly is not "large" in comparison with many chemical companies: Employees number less than 1000. But with the completion of its AEC contract, the company feels it must go more deeply into a study of lithium and manganese in order to build a bright future for itself.

Thiokol Chemical is an example of a small company having spectacular growth through research efforts of a basic nature. Sales increased from $1.1 million in 1948 to $190 million in 1959. Discoveries such as that of polysulfide liquid polymers were major factors in advance of company.

Although Thiokol is now deeply involved in the missile program, research and development expenditures for its chemical division have remained consistently high, averaging about 10% of chemical sales.

A medium-sized company where the fundamental approach has paid off is Merck. In 1959 R & D spending reached a total of some $18.6 million, representing some 8.6% of company's $217 million annual sales.

Although Merck may be considered a drug company, it also has considerable industrial chemical activity which has been greatly assisted by this research program. The company has made many significant achievements in vitamins, antibiotics, diuretics, hormones and silicon chemistry, which could be labeled electronic chemistry.

A principle reason for success of the company as its program for recognizing scientists who have clearly established their unique creativity and giving them maximum opportunity to pursue their work along the lines they feel it should go. As a result, Merck has two members among those selected for chemistry in the National Academy of Sciences. These men are Karl August Folkers and Max Tishler. Dr. Tishler is president of The Merck Sharpe & Dohme Research Laboratories Division of Merck. Influence of these outstanding scientists not only assists company in making important discoveries, but helps them in evaluating the significance of these discoveries accurately and exploiting them successfully.

It's the Individual That Counts

Eastman Kodak once bought an entire English company to obtain the services of one man, the late Dr. C. E. K. Mees, who was also a member of the National Academy of Sciences, under the chemistry division. Although this happened a number of years ago, the thinking behind it emphasizing the importance of creative scientists and basic research is still very much evident, not only in the photographic portion of company's business but also in its industrial chemical activities.

Eastman is planning to spend about $55 million for research, or more than 5% of sales, during 1960. Development is included in this figure. About 20% of research expenditures is for basic or fundamental research. Opportunity for creative study attracts top-flight scientific talent to company. Eastman's Research Laboratory, now headed by Dr. C. J. Staud, was the second industrial research division in the U.S., following the Steinmetz Laboratory at General Electric by only a few months.

Although GE's prime activity is in electricity, its extensive pure research program is also concerned with the chemical activities of company. As a result, it also has a representative, B. H. Zimm, among those selected for chemistry contributions in the National Academy of Sciences. Dr. Irving Langmuir, Nobel prize winner and one of the great figures in industrial research, was a member of GE's research laboratory for 41 years.

GE allows the scientist himself to determine the productive avenues of approach in the field in which he is working. This approach has led the company to notable discoveries in such areas as man-made diamonds, ultrasonics, the fuel cell, silicones, high polymers,

ceramics and metals.

Time Permitted for Hunches, Off-trail Investigations

American Cyanamid is another company that has profited through not confining scientists too closely to the original objective. In fact, every research investigator is encouraged to spend about 10-15% of his time in pursuit of independent ideas. Some important discoveries have been made through these hunches or off-trail investigations.

Cyanamid is giving increasing emphasis to basic research, this being the prime concern at three major laboratories. In addition to notable discoveries in the medical field, basic research has resulted in such notable advances as that in triazine chemistry leading to production of melamine plastic, and phosphate esters leading to Malathion insecticide.

Cyanamid is currently spending about $25 million per year on research, or 4.3% of sales.

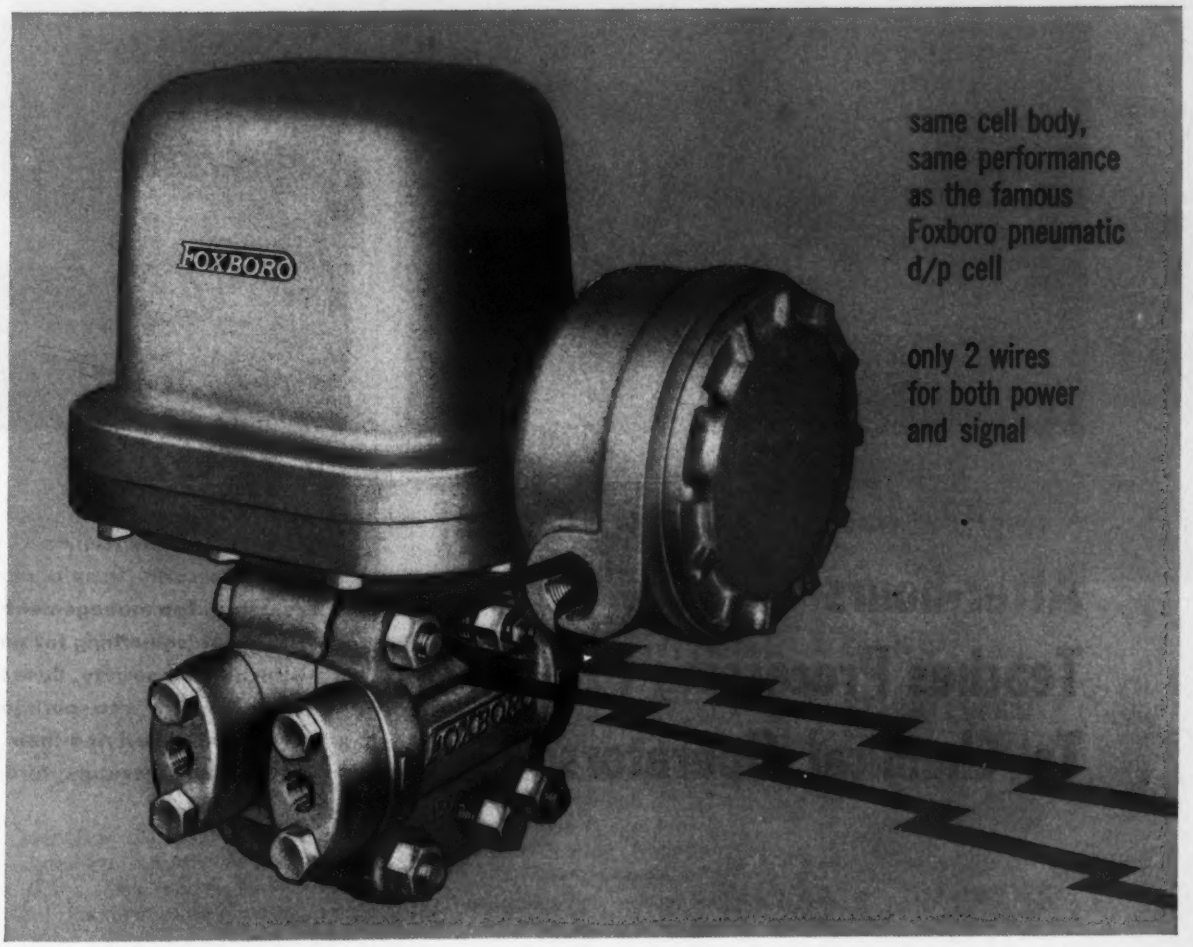
Union Carbide Corporation spent $79 million, or 5.1% of sales, for research in 1959, well above the chemical industry average. Carbide now has 27 research and development laboratories exploring fundamental phenomena such as those occurring at pressures in excess of one million psi and temperatures up to 30,000°F. Reactions of chemicals and plastics are studied under bombardment by electrons and gamma rays at energies up to two million volts.

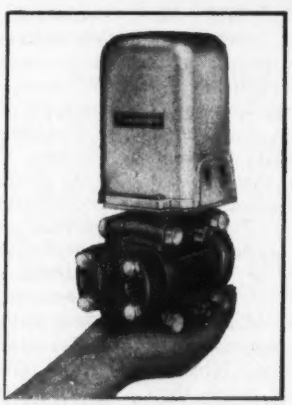
Serendipity has played a part in Carbide's basic research program, resulting in the development of such products as Polyox water-soluble resins, synthetic sapphires and rubies as well as the extremely useful synthetic zeolites known as molecular sieves. The corporation is also actively pursuing fundamental research in the fields of cryogenics, fuel cells and many of the newer space-age metals.

Of the petroleum companies active in petrochemicals, Phillips is particularly noteworthy

To page 90

introducing the Foxboro electronic d/p cell* transmitter





The Foxboro electronic d/p cell transmitter and this Foxboro pneumatic d/p cell transmitter use the identical cell body. Only the top transmitting mechanism has been changed.

Yes, Foxboro has taken its famous pneumatic d/p Cell and added the benefits of electronic transmission. It's the new Foxboro *electronic* d/p Cell transmitter. Look at the results:

- both power and signal travel over the same pair of unshielded wires — no field power supply required
- pressure, flow, and level transmission up to several miles without lag
- true force-balance design for lowest displacement — highest overrange protection
- high level 10-50 ma d-c signal provides powerful rebalancing force
- adjustable ranges from 5" to 850" water with external zero adjustment — working pressures of 1500 and 6000 psi

And, of course, you get the same positive overrange protection, the same high sustained accuracy, the same rugged construction that has always been standard with the Foxboro d/p cell transmitter.

If you're thinking "electronic," it will pay you to investigate this important instrument in the Foxboro Electronic Consotrol* family. Get in touch with your Foxboro Field Engineer for complete details, or write for Bulletin 21-10. The Foxboro Company, 8111 Neponset Avenue, Foxboro, Massachusetts.

**Reg. U.S. Pat. Off.*

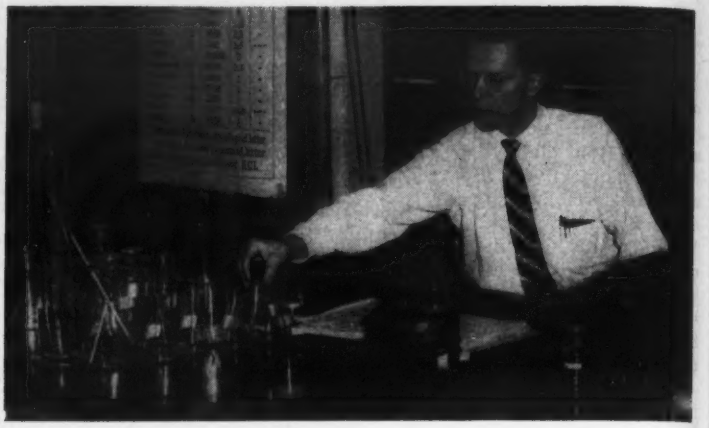
FOXBORO
REG. U. S. PAT. OFF.

Check 1036 opposite last page.

CHEMICAL BUSINESS

This is the Hoffmann-La Roche lecture hall where all sessions in the 11-week course are held. The lectures are conducted in the best tradition of a university

Classroom demonstrations are an important part of the course at Hoffmann-La Roche. Here Dr. A. V. Holmgren, one of the chemist instructors recruited from the plant, is about to demonstrate the effect of catalysis on a chemical reaction



A successful experiment —

After-hours 'College' Teaches Processing Principles To Chemical Operators

Is 'pride in a job well done' an outdated philosophy? Not necessarily, in spite of much evidence to the contrary. Top management can turn the tables on the great 'something for nothing' malignancy afflicting our society. Case in point: Hoffmann-La Roche, Inc., who spark job interest by teaching principles underlying their processing operations to chemical operators, foremen and lab technicians

By **GEORGE BANGS**
Assistant Editor

This is the age of the goof-off, the era of the half-done job, according to Charles H. Brower of Batten, Barton, Durstine & Osborn. Mr. Brower has hit the nail on the head, and it hurts.

All too many employees today have adopted a "Who cares?" attitude as their abiding philosophy. Come to work . . . slide by on the minimum . . . GET PAID . . . and go home (early if at all possible). Something for nothing is the theme song of the sixties. Job interest, pride in work and company loyalty have little significance to such people.

Fortunately, the CPI facet of this picture is not an entirely bleak one. There are a number of chemical companies who are not infested with the debilitating influence of this attitude.

And how have these organizations escaped the sorry plight many of their contemporaries find themselves in? Well, for one thing, they have not been overly preoccupied with sheltering their people in a blanket of coffee breaks and security in the name of "employee morale" and "job satisfaction."

Enlightened top management in such companies long ago realized that a vast majority of workers *want* to be conscientious and to take pride in their work. They have found that all that is usually needed to fan the latent sparks of initiative is effective leadership.

But, what can be done *specifically* to fight the "something for nothing" malignancy if it is rampant in your organization? Why not start by teaching your people more than just the necessary mechanics of their jobs. Why not give them some background on your processes to help them understand the significance and importance of their work? Hoffmann-La Roche, Inc. has met with great success in just such an experiment at their operations in Nutley, N.J.

They have been conducting 11-week courses for chemical operators, foremen and lab technicians on the principles underlying their processes and the equipment involved. In short, they are teaching the men the "why's" of their jobs.

The idea for this project was a product of Roche's Chemical Processing Committee. This group was originally set-up for better coordination among chemists responsible for various processes. These, though completely independent, embody common-denominator problems which are necessarily interrelated. They report their findings and any suggestions directly to top management.

Essentially, what this does is establish a direct line of interpretive communications between the lowest and the highest spheres of the organization. Thus, they avoid the cardinal sin of completely insulating the upper echelons of management from the life stream of the company.

The Committee is headed-up by Dr. Roger Mercanton, director of general plant operations, and staffed by nine chemists and engineers.

A Course Is Born

Several years ago, one of the plant chemists observed that, "A great deal of money is being spent on improving processes and equipment . . . some money should also be spent on helping to improve the men who are going to run these processes."

This started the Chemical Processing Committee digging.

This Is What The Course Covers

1 — Personnel (1 week): company history, products, salary scale, and educational, health, insurance and retirement benefits

2 — Chemistry and Physics (3 weeks): atoms, molecular weights, yield concept, chemical reactions, heat, catalysis, concentration, and physical properties of chemicals

3 — Equipment and Its Operation (3 weeks): reaction kettles, dryers, filters, centrifuges, grinders, evaporators, stills, crystallizers, autoclaves, valves, pumps and corrosion prevention

4 — Services (1 week): water, electricity, steam, sewer system, and tank farm

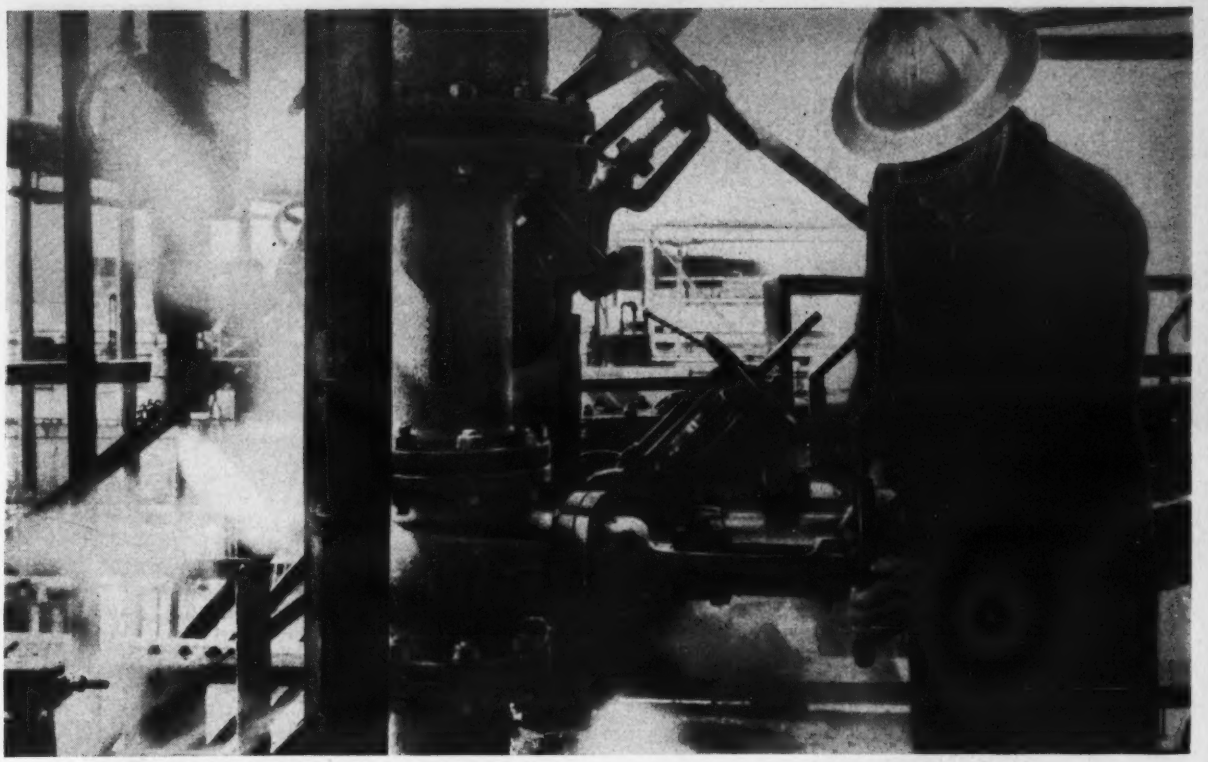
5 — Instrumentation and Electricity (1 week)

6 — Safety (2 weeks)

They found a variation in the industrial and educational backgrounds of their chemical operators. Roughly 10% of them had worked in other chemical companies. A large proportion were formely employed in local silk and woolen mills.

Some men had less than eight years of formal education, while many had finished high school. Few operators had taken any technical courses, but most were highly proficient at their jobs. In spite of the latter, it was discovered that they often did not know *why* they were doing a certain operation in a particular manner.

Acting on these findings, the Chemical Processing Committee presented the outline of a technical course to manage-



30% nickel stainless valve holds off sulfuric acid 14 months

Outlasts others by better than 2 to 1

Handling enough hot sulfuric acid sludge to ruin at least two ordinary valves, this Crane gate valve needed only minor repairs after 14 months. Other valves lasted six months . . . some only three. Here is what helped make the difference:

Stainless alloy plus design

All acid-exposed parts of the valve were cast from "Craneloy 20"*. This 30% nickel, 20% chromium alloy containing molybdenum and copper effectively resists a wide range of hot sulfuric acid concentrations. It also resists certain other mineral acids and many oxidizing and reducing media.

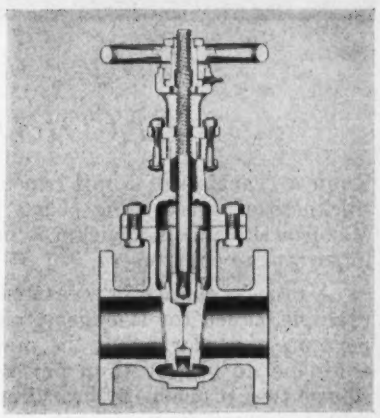
The design of the valve incorporates a special split-wedge disc construction. This minimizes the possibility of galling, reduces wear on seating faces while providing for tight shutoff.

Where Can Nickel Stainless Steel Castings Help You Conquer Corrosion?

In valves, fittings, instrument parts or special equipment operating in corrosive atmospheres, stainless castings offer an excellent opportunity to hold down replacement costs and downtime. So, whether your problems involve chemical corrosion . . . or a punishing combination of corrosives, heat and shock . . . a suitable nickel-containing casting alloy probably can help.

Would you like further comprehensive information? Our new 64-page booklet "Heat- and Corrosion-Resistant Castings — Their Engineering Properties and Applications" is yours for the asking.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N.Y.

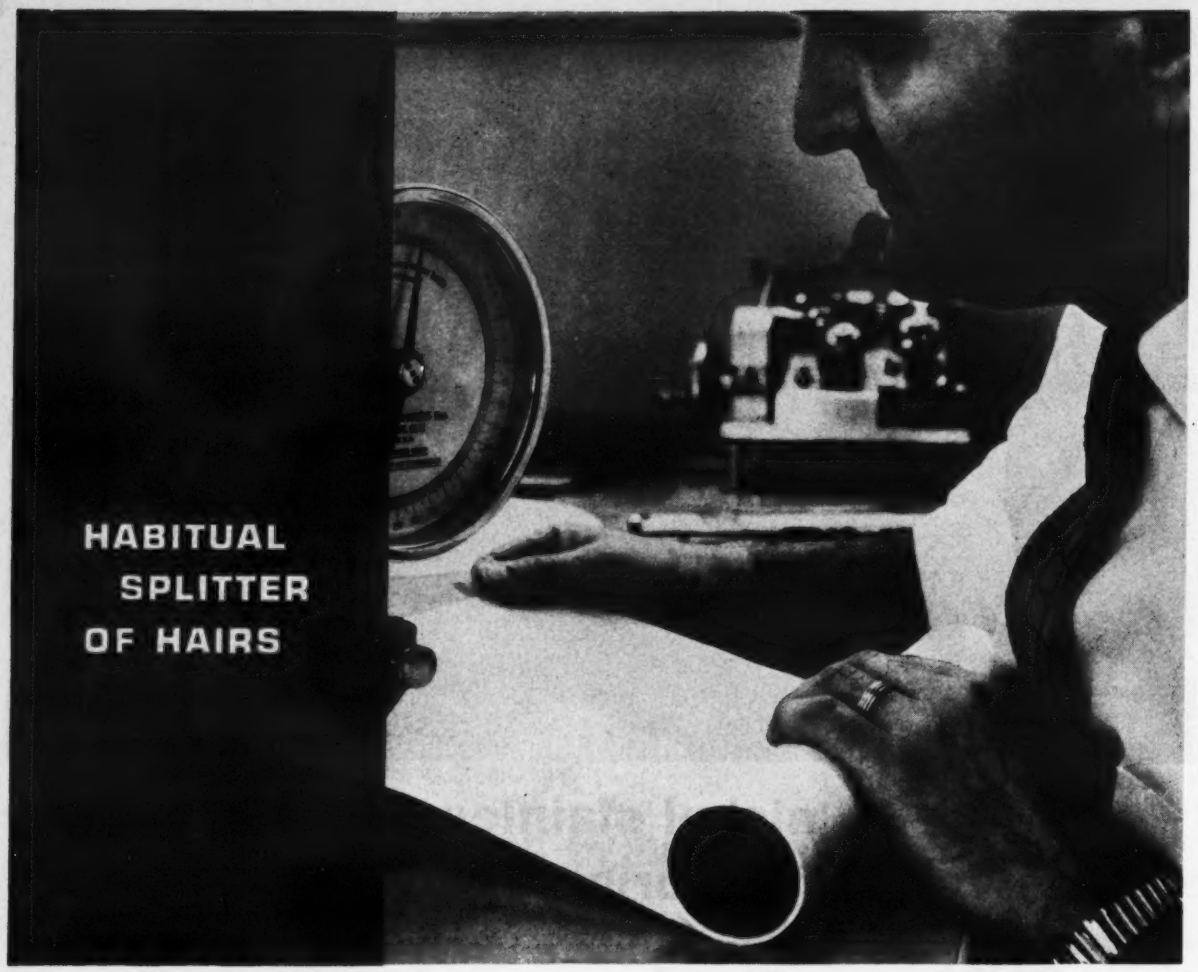


Crane Combines Corrosion-Resisting Alloy, Wear-Avoiding Design. High nickel and chromium contents of the alloy, combined with copper and molybdenum, afford outstanding resistance to sulfuric acid and other corrosives. Split-wedge disc closure enables parts to seat with lighter-than-average pressure... minimizes critical wear and galling. *Crane Co. trademark

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Check 1037 opposite last page.



. . . because a mil can matter greatly in
RECORDING CHART PERFORMANCE

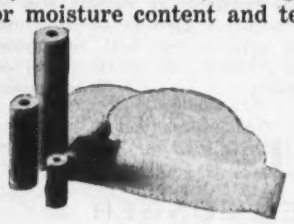
Even a fraction of a mil can bulk large in the thickness of a recording chart. That's why John Mazurowski and his thickness micrometer are so important to chart users.

A process change in an eastern oil refinery, for example, called for a longer strip chart in a temperature recorder — but the diameter of the roll could be no bigger than before. GC engineers solved this problem by working with our paper mills to reduce chart paper thickness from 0.00275" to 0.0019" while preserving strength and flexibility.

To make sure our charts meet the requirements of your instruments, GC engineers test paper stock for moisture content and tear-strength, too. This rigid inspection of paper that is produced exactly to GC specifications is a major reason why GC Recording Charts consistently fulfill their promise of accurate performance.

Other reasons for GC quality include our special formula printing inks, our exclusive innovations in plate-making and printing, and the scrupulous humidity control maintained throughout our manufacturing and storage areas.

GC Recording Charts have become standard equipment in more than 5,000 plants today. We stock more than 15,000 different charts—and will design and produce accurate special-purpose charts. Send for our 1960 Stock List — and for sample charts.



RECORDING CHARTS

Check 1038 opposite last page.

ment. Complete approval was quickly obtained to organize and conduct such classes. In the planning stages, 30 plant chemists and engineers, together with the Personnel and Safety Departments, contributed material. This was edited, well illustrated, and bound into a 200-page manual which serves as a text. An outline of the manual contents is shown on page 47.

The Classes Are Not A 'Snap'

Classes are held once a week for two hours after the normal work day. During each class there is a short coffee break. The 11 weeks of lectures are conducted in the university manner. The class meets in a lecture hall complete with the familiar lab bench. Questions are encouraged and men may stay after class to receive clarification of points not entirely clear to them.

The material is not sugar-coated or watered-down. Except for the obvious need to keep the mathematics on a high-school basis, there is no oversimplification.

The program is supervised by the Chemical Processing Committee. The lecturers are 10 plant chemists and engineers and a foreman. All experiments, exhibits and equipment used during lectures are explained clearly in the manual. Upon completion of the course, an individual is awarded a certificate and personally congratulated by either President L. D. Barney or Paul J. Cardinal, vice president in charge of industrial relations.

The success of the program has been nothing short of phenomenal. It was originally initiated as a temporary effort to educate a limited number of interested personnel. But, as soon as the "word" got around, management was flooded with requests from employees to participate in the classes.

The course has been conducted seven times since its inception in March of 1957. Right now 97% (over 500) of the company's foremen, chem-

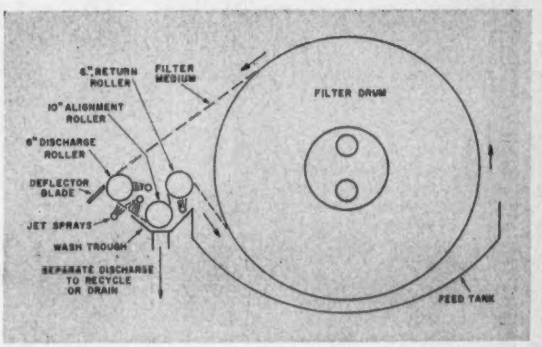
To page 100

Drum takes 2½ to 3½ minutes per revolution. Cake is ⅜-½" thick, breaks cleanly when belt is subjected to sharp change in direction

Solving a floor-space problem as well as streamlining production, two self-cleaning continuous-belt drum filters at A. E. Staley Manufacturing Co. . . .

Dewater 6000 gph sticky solids through only 628 sq ft filter area

TED F. MEINHOLD, Associate Editor
with **ROGER MAUTERER,** Senior Chemical Engineer
A. E. Staley Manufacturing Co.



Cleaning mechanism on continuous belt drum filter automatically removes and washes filter medium during every rotation

Problem: Shortage of floor space threatened to hamper plant expansion plans for handling fine fiber at A. E. Staley Manufacturing Co., Decatur, Illinois. One of the biggest bottlenecks — both space- and production-wise — was the cumbersome and tedious-to-operate batch filtration equipment used for dewatering corn grits (a sticky, 7%-solids, acidic slurry high in protein content) prior to flash drying.

To duplicate the five existing filters would require availability of approximately 1800 additional sq ft of floor space. It was agreed that such a large amount would be difficult to spare.

There were other objections to the old equipment. Labor and downtime requirements were excessive. Operated on an around-the-clock basis, the units had a total filtration area of 6750 sq ft and required two men per shift to keep them going. It took about three hours to filter a batch. The cotton cloths had to be washed periodically because of the slime and blinding nature of the solids. Cleaning, cloth changing and filter reassembling consumed at least an hour — or 25% of the operating cycle. Cloth replacement costs averaged $9000 per year.

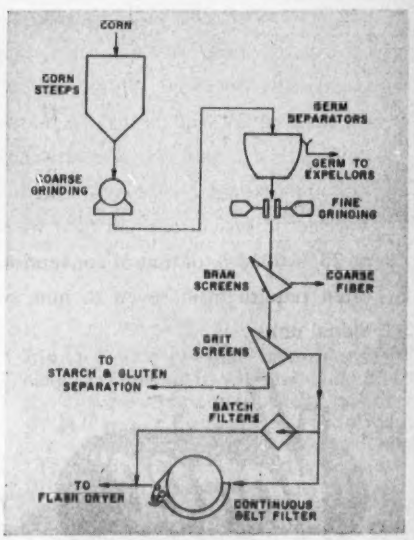
Solution: To meet the requirement of maximum production within limited floor space, Staley engineers installed two continuous-belt drum filters for the dewatering task. A unique feature of the units is a mechanism that automatically removes the filter medium from the drum and allows for continuous washing of the medium. This continuous cleaning minimizes blinding, speeds filtration, cuts downtime and greatly extends service life of filter medium.

The filters are designed for use with metallic media. Staley utilizes ⅛"-thick, fine-mesh, woven stainless-steel belts. Each filter has 10' diameter and 10' face. Filtration area is 314 sq ft. Drum rotates at slow speed, requiring 2½ to 3½ minutes per revolution. Total floor space occupied by the two units and their auxiliary equipment is a bit over 1100 sq ft.

Vacuum levels of 20" are maintained across face of drum. Cake is ⅜ to ½" thick. Product discharges by itself; no air blow or direct-contact scraper blade is used. Cake breaks cleanly when belt is subjected to sharp change in radius of curvature of discharge roll (see drawing). Flexing of cloth tends to extrude any cake lodged in belt. Deflector blade guides product onto a discharge conveyor.

The filter belt is removed from the drum and washed by means of a roller mechanism and jet spray apparatus mounted on front of filter. There are a total of four 10'-long, 2"-diameter wash headers. Each has 30 flat, fan-shaped nozzles spaced 4" apart.

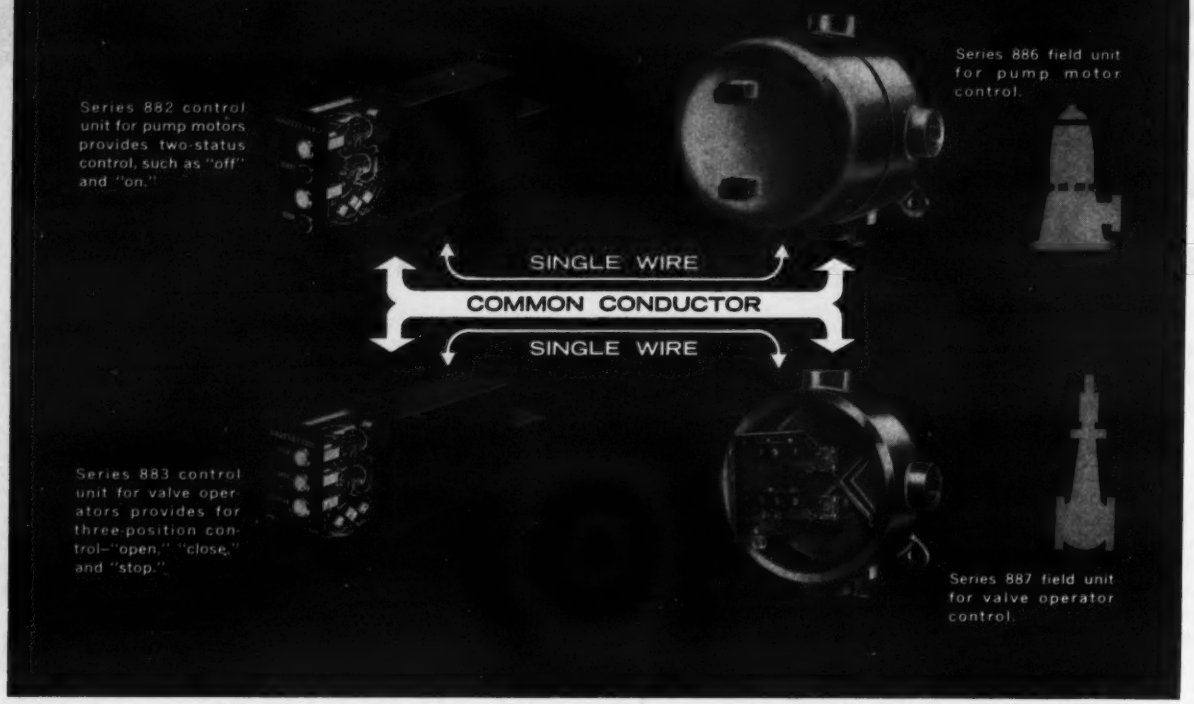
Process liquor is used for washing. Both the front and back of belt are cleaned. Jet sprays scour off any particles that may still adhere to belt. There is no possibility of wash liquor contaminating feed slur-



Simplified flow diagram illustrates how continuous belt filter (bottom) fits into Staley's corn processing operations

VAREC VARELECTRIC

NEW TWO-WIRE SUPERVISORY CONTROL OF PUMPS AND VALVES
COSTS LESS AND PERFORMS BETTER THAN MULTI-WIRE SYSTEMS


Series 882 control unit for pump motors provides two-status control, such as "off" and "on."
Series 886 field unit for pump motor control.
SINGLE WIRE
COMMON CONDUCTOR
SINGLE WIRE
Series 883 control unit for valve operators provides for three-position control—"open," "close," and "stop."
Series 887 field unit for valve operator control.

The Varelectric 880 Series provides direct, instantaneous control of pump motors, valve operators and similar electrically-operated equipment, while continuously supervising and indicating the status of the controlled devices. Using only one wire between each field and control unit, *plus a common conductor for many units,* a Varelectric system can cut field wiring costs to as little as 25% to 15% of that of conventional systems—which often require from seven to nine wires between individual units.

VARELECTRIC offers these advantages:

- **ECONOMY:** Saves from 75% to 85% of field wiring costs... uses two wires instead of many.
- **RELIABILITY:** Uses continuous, well-filtered, direct current... no AC or DC pulsating current used.
- **PRECISION:** Uses the bridge circuit concept... inherently detects trouble.
- **FLEXIBILITY:** Modular construction provides for flexibility of application... dustproof case attaches to operator's control panel.
- **BROAD APPLICATION:** Varelectric systems can control any electrically-operated equipment up to three statuses.

For applications in the petroleum and chemical industries, or wherever control is vital, Varelectric furnishes the most modern, economical solution to control problems. For full details, send for Bulletin CP-3708. Write Dept. CP 1141-2.

"Varec" TRADE ® MARK

THE VAPOR RECOVERY SYSTEMS COMPANY
2820 North Alameda Street • Compton, California

Branches and Representatives in Principal Cities.

Check 1041 opposite last page.

NEW SOLUTIONS

ry or filtrate, since belt is washed while away from drum. Products from wash operation are recovered in wash trough, ready for recycling or discharge into disposal system.

Washing pressure can be adjusted to control blinding tendency of slurry being filtered. Either periodic or continuous spraying may be used.

An electro-pneumatic mechanism keeps belt properly aligned. Sensing micro switches are located on both edges of belt. Alignment is controlled by the aligning roller which is split in two halves. One half is fixed while the other portion is movable in either direction parallel with the axis.

When a switch is engaged, movable half of roller shifts in proper direction to maintain alignment. Action is accomplished by an air-pressure/solenoid arrangement and occurs once each revolution until switch cuts out. Alignment adjustments are generally made no more than once every 15 minutes. Operation is entirely automatic.

Results: Staley's plant expansion goals have been successfully reached. The two continuous-belt drum filters easily handle the increased volume — about 6000 gal slurry per hour. Although the units occupy 40% less floor space than the batch equipment (1100 vs 1800 sq ft), they dewater corn grits 11 times faster, using only 1/10 the filtration area (see table on page 52.)

Filters operate 24 hours per day, six days a week. Units require little attention. Only one part-time operator per shift is needed. The metal belt is steam-cleaned once a week. This is done manually and consumes about ½ to ¾ hour per filter. The cleaning is primarily a precautionary measure. It is normally done prior to the Sunday shutdown and eliminates the possibility of any residual material plugging up the belt over the weekend.

Since the filter medium is of the permanent type (estimated life is 10 years), there is no cloth maintenance or washing to be concerned with.

To page 52

THAT'S INTERESTING

Reservoir of plastic

Citizens of Lancaster, Calif., are using water stored in a huge plastic reservoir. Methods of using vinyl plastic for large swimming pools were adapted for the project which employs a 21,680 sq ft liner.

50-yr life for books

A useful life of less than 50 yr is estimated for 90% of paper produced during the past half-century, according to a study conducted by the Virginia State Library. The study also reported that it is possible to make paper having a useful life of 400 yr or more. Use of wood pulp in combination with acidic sizing chemicals is blamed for relatively short life of papers.

Long-lasting paper could be made of wood pulp by replacing acidic chemicals with new chemicals able to function under alkaline conditions and filling paper with $CaCO_3$ buffer.

CUT FUEL BILLS 20% WITH A LJUNGSTROM® AIR PREHEATER

The world's largest fluid catalytic cracker at Esso's Bayway Refinery is equipped with a new Ljungstrom Air Preheater. This picture shows the half-ton cold-end elements being installed in the Ljungstrom rotor.

Your biggest refinery operating expense is the money you burn: fuel costs. You can chop fuel bills ⅓ with a Ljungstrom Air Preheater, and here's how:

Your fuel bill drops about 1% for every 45-50°F you raise the temperature of combustion air. Ljungstroms now in service raise the air temperature 1000°F or more – and the rest is simple arithmetic. With a Ljungstrom, four barrels of fuel do the work of five. On fuel savings alone, one eastern refinery came up with net savings of $67,800 in the first year they used a Ljungstrom.

SAME FUEL, MORE HEAT. Ljungstrom economy is flexible economy. If total throughput is more important to you than fuel savings, a Ljungstrom can help boost the capacity of a pipe still at least 10% a day, without any increase in fuel consumption.

THESE ARE FACTS backed up by 25 years of Ljungstrom performance in refineries all over the world. But they're not the only facts. To find out about Ljungstrom's low-cost maintenance, easy inspection, in-service cleanability, space-saving compactness, call or write The Air Preheater Corporation for a free copy of a brochure called "The Ljungstrom Air Preheater for Process Equipment."

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

Check 1042 opposite last page.

Staley Filtration

From page 50

Plant sanitation is easier too.

The units have had a definite effect on the flash drying operation. Filters insure a continuous flow of uniform moisture content material to the dryer. Cake's somewhat higher moisture content (75 vs 55%) is offset by improved dryer efficiency.

Some specific figures illustrating economic and operating characteristics for the two types of filters are as follows:

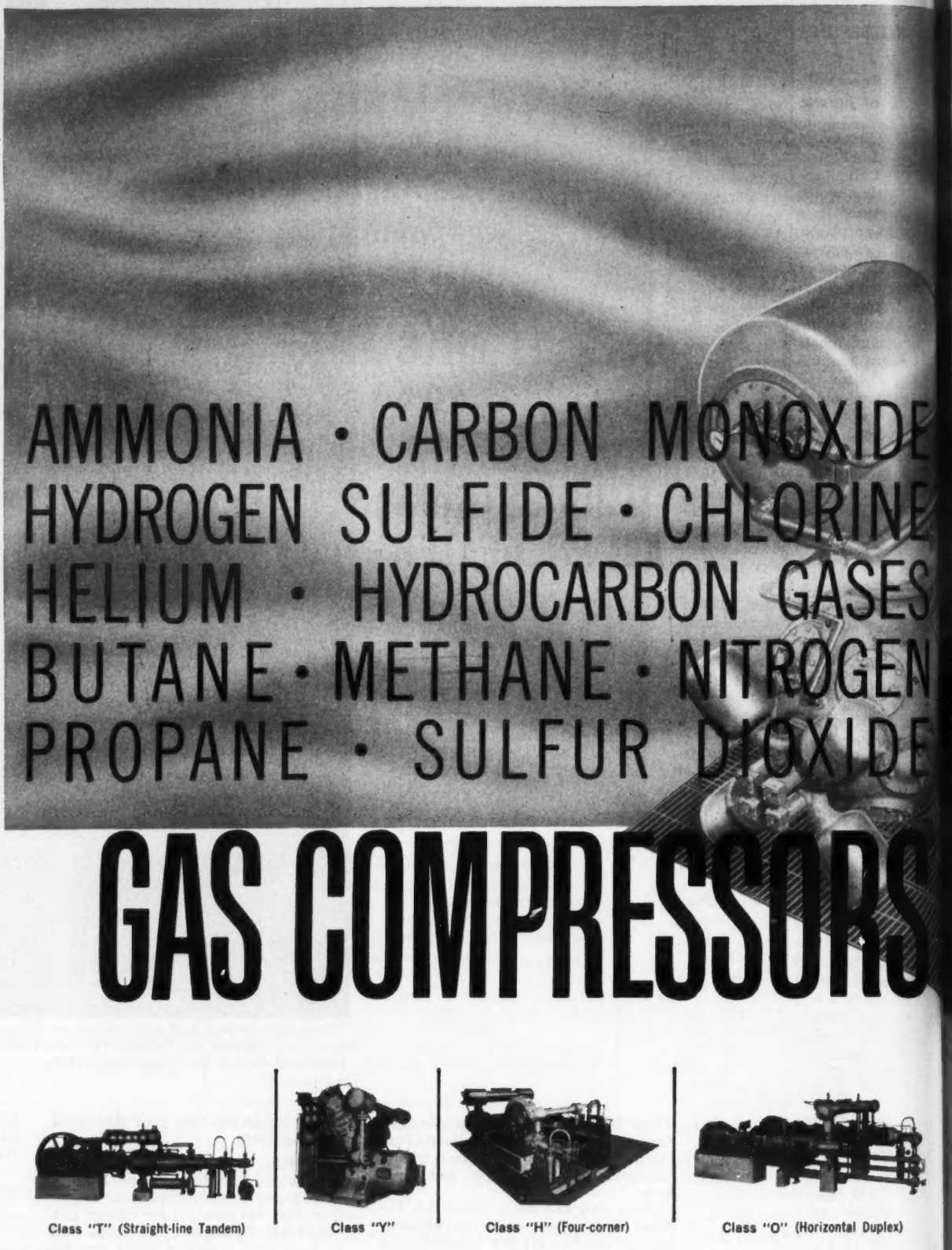
	CONTINUOUS	BATCH
Filtration area, sq ft	628	6750
Filtration rate lb solids per hr/sq ft	6.5	0.5
gal filtrate per hr/sq ft	8.7	0.9
Labor/shift, men	0.5	2.0
Labor cost/yr, $	11,500	46,000
Power cost/yr, $	600	1900
Filter cloth cost/yr, $	—	9000
Belt cost/yr, $ (est. 10-yr life)	1000	—

Continuous filtration has worked out so well that serious consideration is now being given to plans for replacing the remaining batch units.

Both of the continuous filters will be soon equipped with an auxiliary spray-header that should either eliminate or further simplify the weekly steam-cleaning job. The system will utilize 50 spray nozzles and will hurl 45-psi, 200°F cleaning solution (water, trisodium phosphate and Oakite mixture) through the filter medium.

Difficulty was originally experienced with the alignment mechanism, which resulted in relatively high maintenance costs. However, this has been rectified by manufacturer's redesign.

Recently, some trouble has been encountered with the molded rubber covering on the alignment roller. Continuous contact with the belt's relatively coarse metal surface, together with SO_2 and SO_3 atmospheres, caused the initial rubber to become loose



and chip off. It is believed that a combination of tougher and different formula rubber, plus vulcanizing and riveting, will remedy this situation.

(Further information about Eimcobelt continuous belt filters may be obtained from Filter Division, The Eimco Corp., 634 S. 4th West St., Salt Lake City 10, Utah.)

Check 1044 opposite last page.

Ceramic ferrules cut tube failures at refinery

Problem: Abrasive and corrosive action of gases such as hydrochloric acid and hydrogen sulfide caused heat exchanger tubes to fail at a large, southwestern refinery. Frequent replacement was costly — both from standpoint of tubes themselves and amount of downtime required.

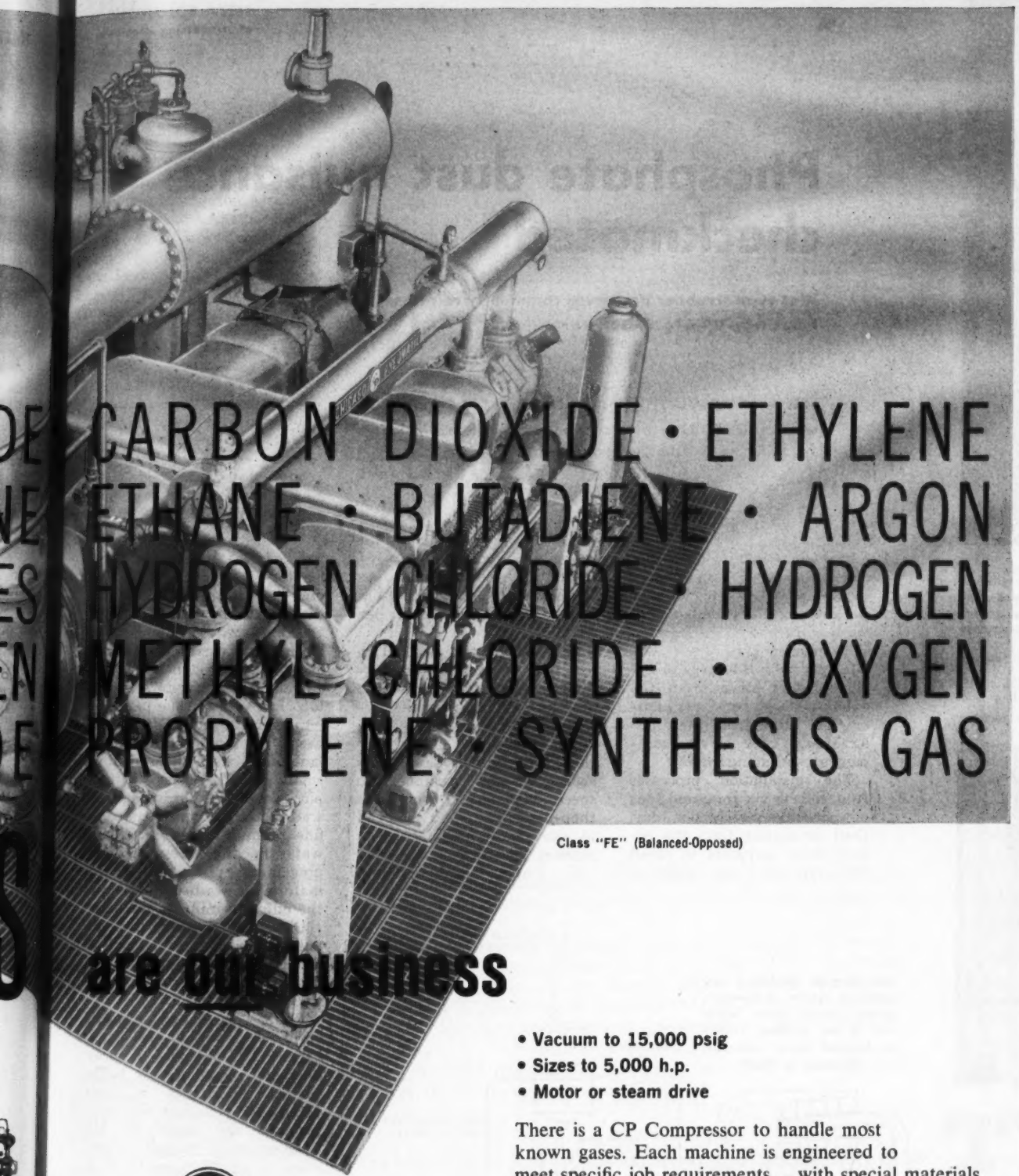
Solution: Ends of tubes were fitted with ceramic ferrules and encased in acid-resisting cement. The ceramic body can withstand temperatures as high as 2400°F. Material resists all vapors and liquids except hydrofluoric acid. The ferrules are available in a number of compositions and can be made to specification with ¼ to 2" ID, and lengths up to 12".

Ceramic ferrules fit into ends of heat exchanger tubes, withstand 2400°F, extend service life

Results: The ceramic ferrules have turned out to be a practical and low-cost solution to the heat exchanger wear problem. Tube life has been greatly extended, resulting in considerable savings in maintenance and downtime.

(Ceramic ferrules are product of Saxonburg Ceramics, Inc., Saxonburg, Pa.)

Check 1045 opposite last page.


CARBON DIOXIDE • ETHYLENE
ETHANE • BUTADIENE • ARGON
HYDROGEN CHLORIDE • HYDROGEN
METHYL CHLORIDE • OXYGEN
PROPYLENE • SYNTHESIS GAS

Class "FE" (Balanced-Opposed)

are our business

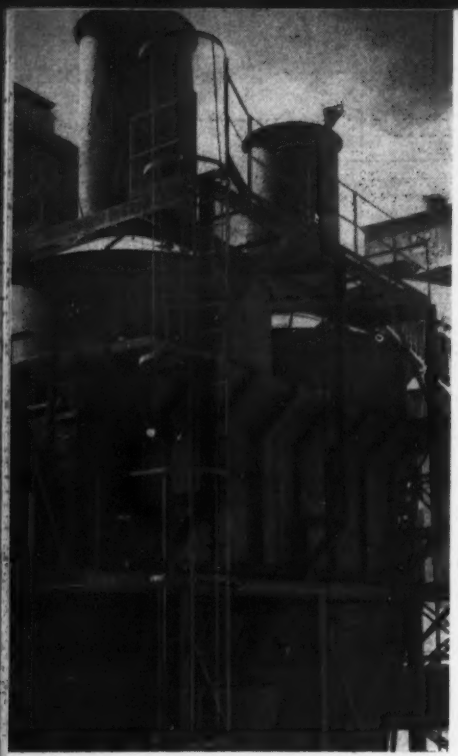
- Vacuum to 15,000 psig
- Sizes to 5,000 h.p.
- Motor or steam drive

There is a CP Compressor to handle most known gases. Each machine is engineered to meet specific job requirements... with special materials, construction, capacity and pressure controls to suit process demands.

Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

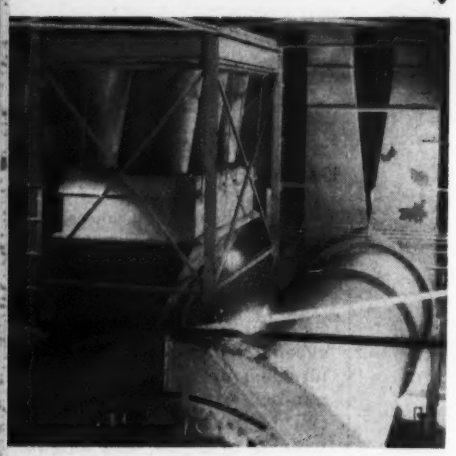
AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

Check 1043 opposite last page.



To simplify and speed installation, scrubber was shop-assembled and shipped to site ready for placement on support structure

Battery of cyclones (center, rear) recover bulk of dust emanating from rotary dryers



Phosphate dust nuisance checkmated

Wet-type scrubber preserves community relations, helps trap 99.6% of pollutants

TED F. MEINHOLD, Associate Editor
with **W. R. FORT,** Manager, Florida Phosphate Division
W. R. Grace & Co., Davison Chemical Division

Problem: Although the newly installed phosphate-rock drying system at the Bartow, Florida, plant of W. R. Grace & Co.'s Davison Chemical Division was equipped with a battery of cyclones, dust losses from the exhaust stack were still higher than Grace felt were desirable in view of the company's rigid standards.

The installation processes from five to six thousand tons of phosphate rock per day. Dust emanating from the rotary dryer amounts to about 220 tons per day, most of which was recovered by cyclones. However, exit gas stream still contained from one to five grains dust per cu ft.

Solution: It was decided to install a secondary dust collection system to trap the fine product slipping past the cyclones. After considering various equipment, plant purchased a relatively simply designed, wet-type scrubber. To speed installation, unit was shop-assembled and shipped to site ready for placing on support structure.

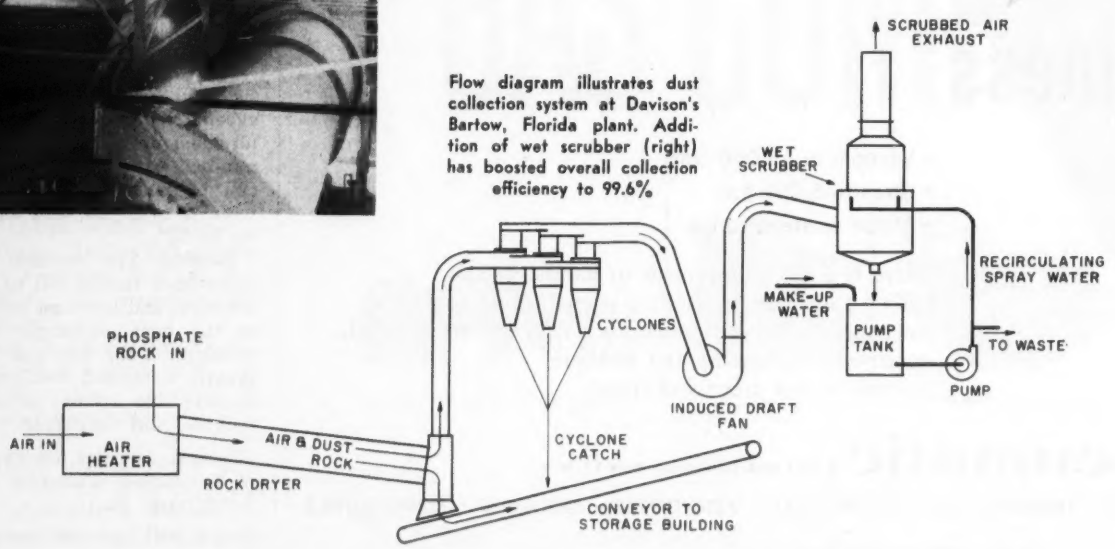
A single scrubber unit handles the total gas flow leaving the cyclones. The device has two gas inlets and the gas stream passes through washing sprays, impingement baffle plate cleaning elements and finally through two water entrainment separators at the top of the vessel. The patented impingement baffle plates break up the incoming dust-laden gas into thousands of small jets. These gas jets impinge at high velocity against wetted baffles which trap the fine product in the scrubbing water flowing across the impingement plates. Collected material is washed down into the effluent drains at the base.

Clean gas passes up through entrainment separator and is discharged to atmosphere. Exit temperature varies between 85 and 100°F.

Water circulation through scrubber is about 450 gpm. Of this, 215 gal goes to spray headers, remainder to baffle plates. All parts of unit coming into contact with wet product are made of 316 stainless steel. Overall dimensions of scrubber are 11′ 9″ x 24′ 6″ max cross-section x 14′ overall height.

Immediately below the scrubber is a recycle tank and pumping system for recirculating the scrubbing water. Makeup water is also added at this point. Collected waste slurry is continuously

Flow diagram illustrates dust collection system at Davison's Bartow, Florida plant. Addition of wet scrubber (right) has boosted overall collection efficiency to 99.6%



drawn off and pumped to plant's disposal system.

Results: Adding the scrubber to the system has boosted overall dust collection efficiency to 99.6%. Exit-gas grain loadings have been cut from 1-5 down to well below 1.0 per cu ft.

Neighbors Happy

Because of its virtually dust-free exhaust, the plant is enjoying excellent community relations. Neighbors have nothing but favorable comments. Other phosphate plants in the area have also indicated interest in the equipment.

At this writing, the scrubber has been in service approximately one year. Performance has been good and no major maintenance has been required.

Fresh water makeup runs about 100 gpm. Waste slurry drawoff accounts for 60 gpm. The remaining 40 gal is lost by evaporation.

(Further information about Peabody scrubbers may be obtained from Peabody Engineering Corporation, 232 Madison Avenue, New York 16, N.Y.)

Check 1046 opposite last page.

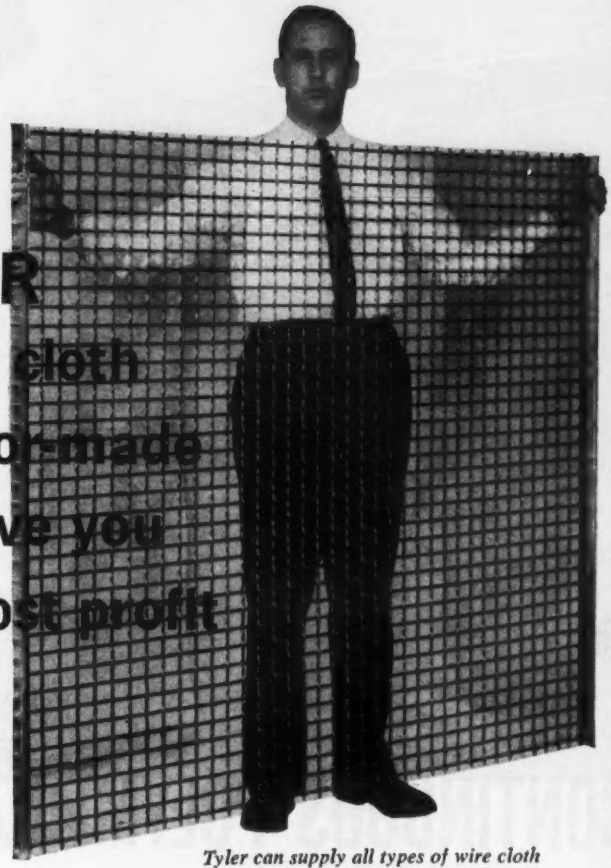
Save 2500 ft ductwork by covering with polyester-glass

Corroded duct serves as mandrel for new pipe

Problem: Corrosion damaged galvanized ductwork in a Cleveland plating plant. Replacing the old duct system would involve considerable labor and equipment costs and would require that the plant be shut down.

Solution: The corroded ductwork was covered with glass-reinforced polyester. In effect, the old duct system served as a mandrel on which new pipe was formed. The job was done

TYLER wire cloth is tailor-made to give you the most profit

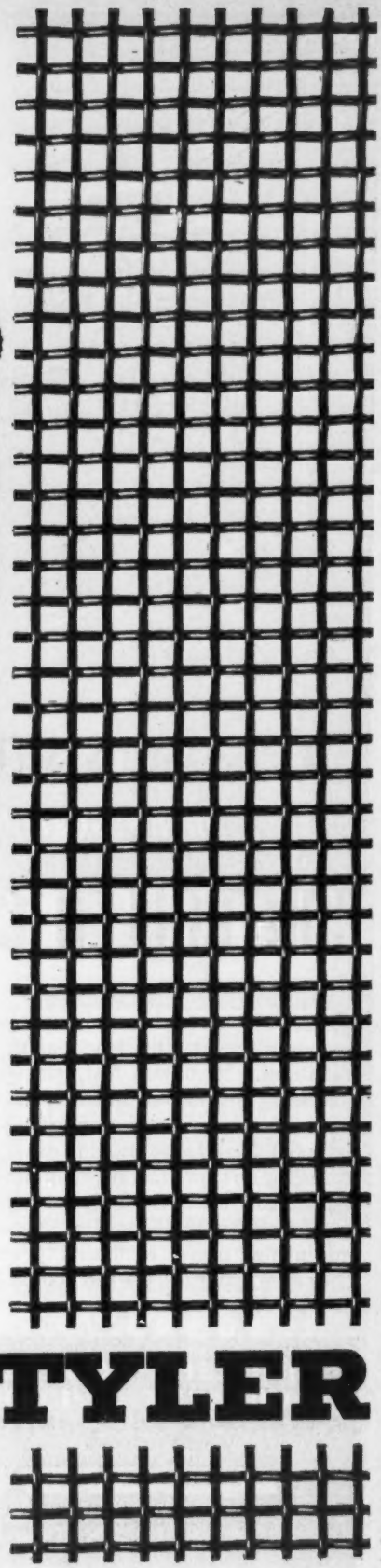


Tyler can supply all types of wire cloth — and screen sections fabricated to fit every existing type of vibrating screen.

Tyler does more than manufacture 53,000 different specifications of wire cloth. It starts by designing the specifications to solve each problem to your greatest profit.

Selection and control of the metal is important—especially where corrosion, abrasion, or contamination are factors. Tyler controls the design of all metals and alloys used in weaving, and in addition operates its own wire mill for processing all its non-ferrous and many of its stainless steel wires. Tyler Screens are literally tailor-made for maximum profit to the user.

Ask your Tyler representative for full information—through him you'll get *Tyler Screening Service*.



TYLER

WOVEN WIRE SCREENS • SCREENING MACHINERY • TESTING SIEVE EQUIPMENT

The W. S. TYLER Company • *Cleveland 14, Ohio*

OFFICES: New York • Chicago • Boston • Philadelphia • Atlanta
Dallas • Los Angeles • San Francisco • Baltimore • Birmingham • Houston • Minneapolis
Pittsburgh • Salt Lake City • The W. S. Tyler Company of Canada, Limited,
St. Catharines, Ontario • OFFICE: Montreal

Check 1047 opposite last page.

From preceding page

from the maintenance department of the plant.

First step was to paint the corroded ductwork with polyester resin. Then a layer of glass mat saturated in the resin was placed around ducting. Another saturated mat

Glass mat impregnated with polyester resin and wrapped around corroded galvanized ductwork bypassed need to tear down and replace old duct system

was applied, and finishing coat of resin was then brushed over the glass.

A total of 2500 ft of ductwork was covered with sizes varying from six to 18″ in diam.

Results: The ductwork is as good as new. The glass-reinforced polyester is highly resistant to corrosion and is expected to have long service life.

(Further information about glass-reinforced polyester pipe covering technique may be obtained from Heil Process Equipment Company, 12901 Elmwood Ave., Cleveland 11, Ohio.)

Check 1049 opposite last page.

(Atlac 382 polyester resin used in the process is the product of Atlas Powder Company, Wilmington 99, Delaware.)

Check 1050 opposite last page.

NEXT MONTH

Carbonaceous residue resulting from compressor lubricant oxidation can be a serious troublemaker — especially if high exhaust air temperatures are involved. How Chas. Pfizer eliminated explosion threat and cut compressor maintenance downtime is revealed in one of the articles appearing in our next issue.

A PACKAGED SYSTEM
for investigation of
CONTROLLED CONTINUOUS POLYMERIZATION

VOTATOR* processing equipment is used for continuous polymerization reactions in numerous installations. It affords fast, efficient, controlled processing not possible in batch reactors.

Girdler's experienced engineers operate extensive pilot facilities to provide exact specifications for scaling up to production equipment. VOTATOR engineered systems are designed to meet your own specific process requirements. These systems provide a high degree of flexibility and versatility. They save materials, use less floor space and assure significant overall operating economy.

Rugged, dependable VOTATOR continuous reactors are fabricated by skilled craftsmen in strict compliance with ASME codes. Materials of construction are carefully selected according to the properties of products processed.

Packaged VOTATOR pilot systems are now available for studies of continuous reaction processes in your plant. For additional information write Girdler Process Equipment Division, P.O. Box 43, Louisville 1, Kentucky.

*VOTATOR—Reg. U. S. Pat. Off.

GIRDLER PROCESS EQUIPMENT DIVISION
CHEMETRON

VOTATOR CONTINUOUS PROCESSING EQUIPMENT FOR CHEMICAL & FOOD INDUSTRIES · VOTATOR PISTON & GRAVITY FILLERS · VOTATOR PLANTS FOR FATTY OILS INDUSTRY · THERMEX DIELECTRIC HEATING EQUIPMENT

Check 1048 opposite last page.

Up to 100 gpm PVAc filtered by self-cleaning units at Celanese

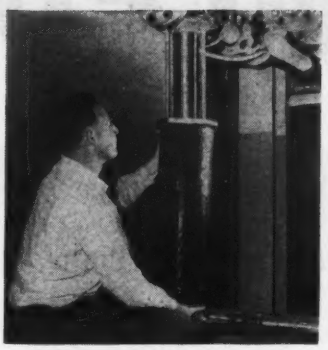
Minimum filter downtime and maximum production rates are being realized by use of automatic self-cleaning, metal-edge units at the Belvidere, N.J. plant of Celanese Corporation of America. Used to filter polyvinyl acetate latex prior to storage, the filters remove "skins", grits and other foreign particles.

Two units are operated alternately. Each handles 50 to 100 gpm of emulsion at 25 to 30 psi.

A continuous cleaning action takes place within the filter. Accumulations are removed from filter surfaces by two stationary blades that constantly scrape outside edge of motor-driven element rotating at 7½ rpm.

Filter media consists of a specially-formed ribbon of wire wound into cylindrical form. Risers on the wire space one coil from the other and determine degree of filtration efficiency.

Celanese passes several thousand gal of emulsion through each filter before shutting them down to remove solids accumulations. Operating filters on alternate cycles provides ample time for cleaning during normal downtime periods. Steam is used to dislodge emulsion from filter. Rinse with warm water then ejects any remaining residue. Occasionally a solvent is used.



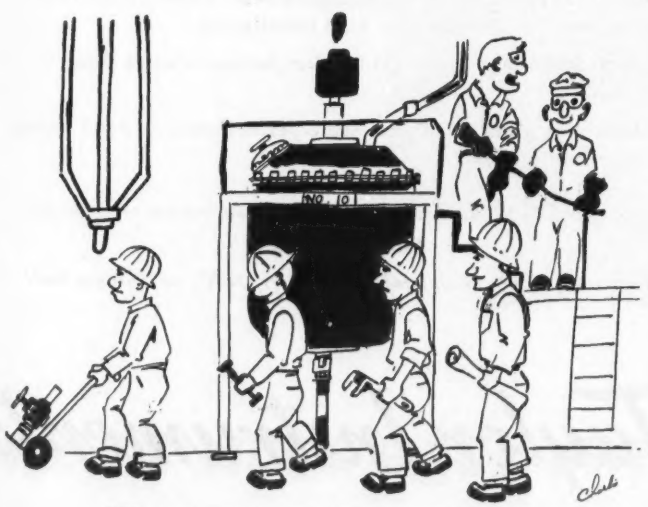
Housing being removed from one of the two metal-edge filters handling PVAc latex emulsion at Celanese

(Further information about Metal-edge filters may be obtained from Purolator Products, Inc., Rahway, N.J.)

Check 1051 opposite last page.

Phosphate production from low-grade carbonaceous ore is considered in six-page reprint. Details of process are cited, including flow diagram of the flotation and reactor plants at San Francisco Chemical Company's Leefe, Wyoming, installation. Reprint 7059—Dorr-Oliver Incorporated.

Check 1052 opposite last page.



"The last one is carrying the ambition."

First Showing OF A NEW LINE

Modern Processing Equipment for the Chemical, Paint and Ceramic Fields . . . Advanced in Design, Sound in Quality, Favorably Priced! Wide Range of Products and Sizes—
Write for Descriptive Catalog.

NEW NEW NEW

Belt-Driven Mills

- Quick-Acting, Precision-Fit Doors (Round or Square)
- Unique Machined Short Trunnions, Adjustable for End Play
- Rigid, Fabricated Heads and Frame

Here's a new measure of economy, *plus profitable grinding,* International Belt-Driven Mills incorporate many design features not before available—for example, Type BD can be furnished with internal teeth on the main gear ring for better protection from dirt.

Type BD—with optional internal teeth on main gear.
Type SM—with torque arm belt drive.

INTERNATIONAL
PROCESS EQUIPMENT COMPANY DIVISION

AGITATORS • MIXERS • DRY BLENDERS • EXTRUSION MACHINES • FANS and other PROCESS EQUIPMENT

Check 1053 opposite last page.

Alumina refractory resists hot sulfur and sulfuric at Atlantic Refining

Baffle wall resists corrosion at high temperatures

Problem: High heat and corrosive action limited baffle-wall life in sulfur-burning furnace at Atlantic Refining Company, to two or three years. Some maintenance was required every year.

Furnace is used to burn hydrogen sulfide sulfur and spent acid to obtain sulfur dioxide for sulfuric acid manufacturer. Daily feed to furnace consists of 5 to 10 tons of sulfur; 50 tons of spent sulfuric acid; and 20-30,000 cubic feet/hr of hydrogen sulfide. Fuel gas is

Operator checks fuel feed to H_2S-burning furnace at Atlantic Refining Company

added to maintain temperature and proper burning conditions. Furnace temperature ranges from 1900 to 2100°F.

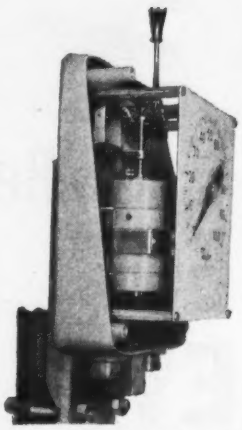
Furnace flue gas is cooled, washed, dried and sulfur dioxide converted to sulfur trioxide. This gas is then absorbed in sulfuric acid. Plant produces 100 to 130/tons of 99% H_2SO_4 per day.

Solution: Based on tests, experience of other manufacturers with similar operations, and recommendation of refractory manufacturer, first baffle-wall of furnace (there are three) was faced with a 90% alumina refractory. Installation was made early in 1959. Since sulfur and hot gases impinged on this wall, it was the first to fail ordinarily.

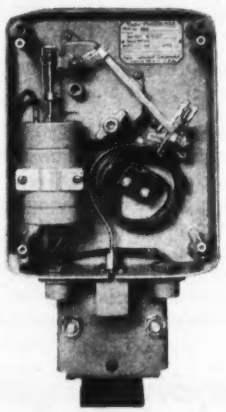
As a prior test, these Korundal brick had been installed in a test portion of this baffle-wall in 1957, together with conventional refractory materials. When main wall failed, examination of the test brick indicated that they had suf-

Now... Servo Power in

A high-accuracy, low-cost, motion-balance transmitter for Gage Pressure, Volumetric Pressure, Volumetric Load, Temperature



Diagonally-split case permits calibration adjustments to be made without removing dial.



Single-package pneumatics . . . servo-powered follow-up and relay valve, encapsulated movement and actuating element are easily removable, replaceable.

Taylor's new integrated line of pneumatic transmitters features servo-driven indication as an option on the indicating model. This provides ample power for process alarms—and other auxiliary functions such as digital encoders and potentiometers—with no loss of accuracy in the transmitted signal. Not only does it satisfy today's requirements . . . it provides for possible future needs. Other important features of the TRANSCOPE **210T** include:

- **High accuracy.** Transmitted signal is within ½% of the input signal. Indication is within ±1% of actual value.
- **Exceptional readability.** Big 11¾" long concentric 270° scale can be read easily at 25-35 ft. Yet case measures only 7" x 9" x 4".
- **Threshold sensitivity.** 0.1% of input span. Low-friction drive mechanism permits accurate handling of low-energy input signals.
- **Designed for easy maintenance.** Only 3 basic parts. A high quality encapsulated motion amplifier; single-packaged pneumatics . . . servo-powered follow-up and relay valve; interchangeable, time-tested actuating elements.
- **Lower inventories.** Benefits large users of instruments by utilizing actuating elements which are common with FULSCOPE® and other Taylor indicating, recording and controlling instruments.
- **Conveniently calibrated.** Diagonally-split case makes all adjustments easily accessible by merely removing cover.
- **Weatherproof case.** Special baked epoxy resin finish on die-cast aluminum case . . . designed for field installation.
- **Adaptable mounting.** Universal bracket permits wall or pipe installation.
- **Non-indicating model (211T)** has same performance as 210T except for process indication.

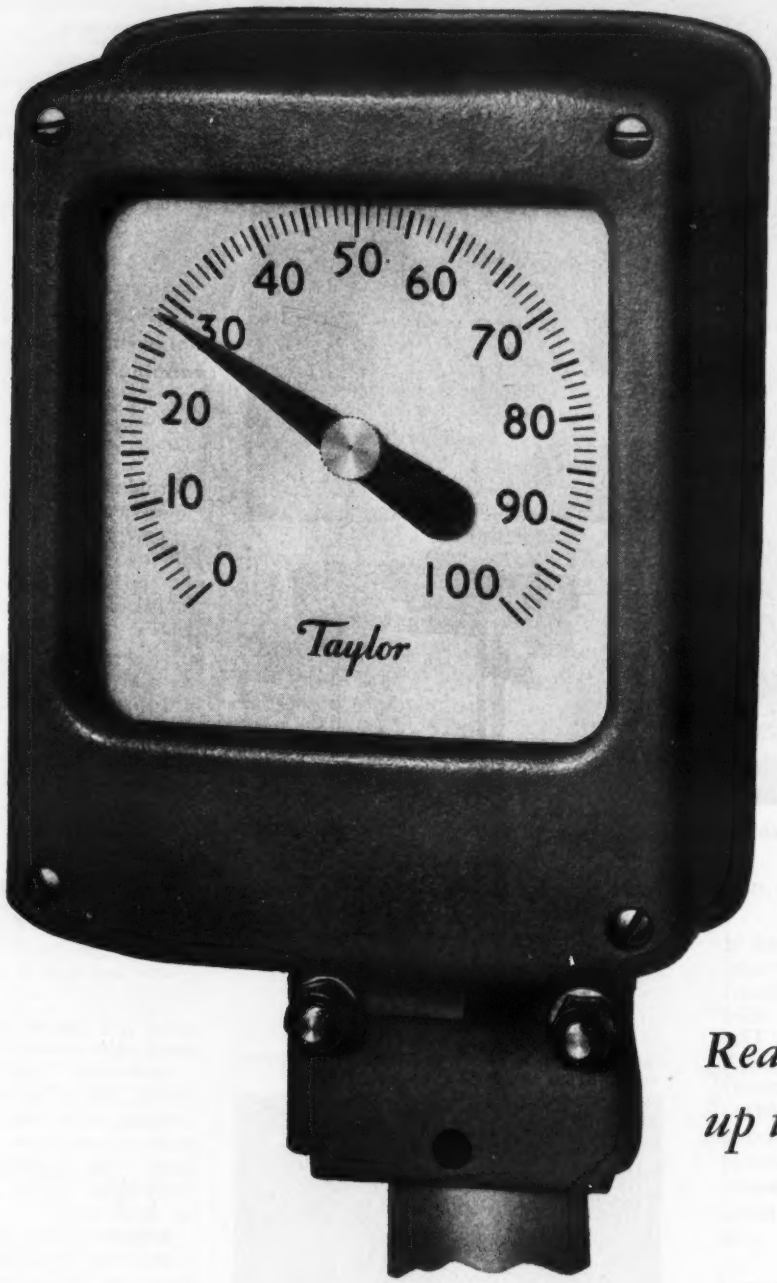
Ask your Taylor Field Engineer for a demonstration, or write for

Bulletin 98385

Taylor Instrument Companies, Rochester, N.Y., or Toronto, Ont.

Taylor Instruments

New Taylor TRANSCOPE® Transmitter



Read it up to 35 ft.!

MEAN ACCURACY FIRST

Check 1054 opposite last page.

fered little deterioration.

Results: Wall faced with Korundal refractory has been in almost continuous service since installation, without maintenance. Although subjected to high temperature and corrosive and erosive action, it is still in good condition and expected to give extended service.

(Korundal alumina refractory is a product of Harbison-Walker Refractories Company, 307 Fifth Avenue, Pittsburgh 22, Pa.)

Check 1055 opposite last page.

Pressure tank-trailers haul sodium tripolyphosphate in dry bulk form

36,000 lb minimum payload is piped direct to bin in hr

A seven-year search for an efficient means of hauling sodium tripolyphosphate powders in bulk form has been ended by Chemical Tank

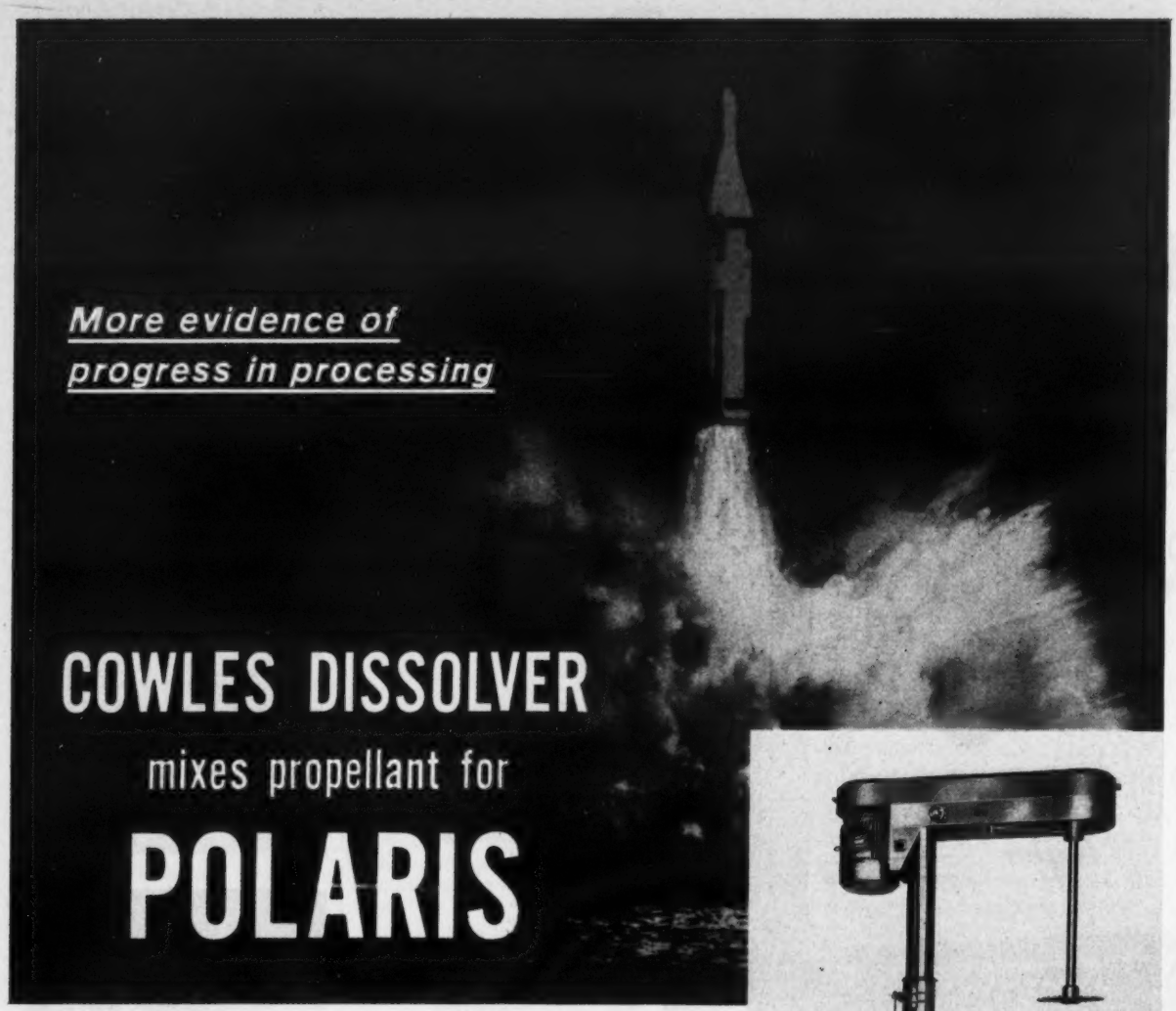
Pressure tank-trailer is used to haul dry bulk sodium tripolyphosphate

Lines of Downington, Pa., with adoption of pressure tank-trailers.

Trailers with minimum payload of 36,000 lb are operated from point near Philadelphia to a Baltimore plant manufacturing soap detergent materials.

Sodium tripolyphosphate is unloaded pneumatically — direct from trailer to storage bin — by means of tractor-mounted blower driven by power take-off. Powder flows to center discharge valve and out through hose and 4" pipe to bins — distance of 125 feet — 75 of it vertical. Trucks are unloaded in hour.

Tank-trailers — identical to those used by hauler for ce-



More evidence of progress in processing

COWLES DISSOLVER

mixes propellant for

POLARIS

To meet the challenge of producing space-age fuels in big volume for missiles and rockets, Aerojet General Corp. engineers have designed the first continuous process for propellants.

A monster Cowles Dissolver was chosen as the key unit in the system for maximum efficiency in changing from batch-type paste mixing to the continuous method. Advantages are noteworthy –

1. Big volume fuel production for large missiles and rockets now practical for first time.
2. Labor costs cut 80%.
3. Fire and explosion hazards greatly reduced.
4. End products higher in quality and more uniform.

The same unique features of the Cowles that helped Aerojet engineers make this significant processing advancement offer you similar advantages. The patented Cowles impeller teeth that make "the BIG difference" and the exclusive MPD* (Maximum Power Delivery) drive that delivers plenty of power to the impeller even at slowest speeds will produce ultimate dispersion for you faster – *in less space – at less cost.*

*Trademark

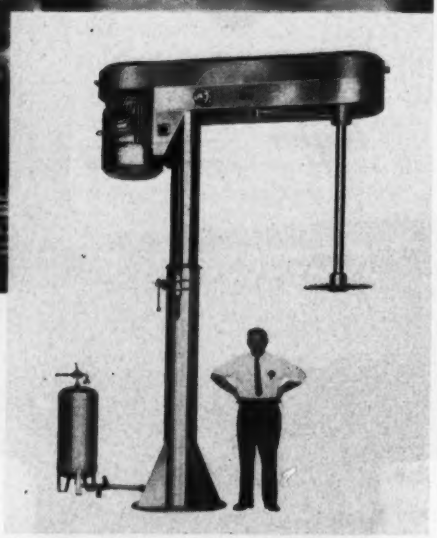
LET US PROVE IT IN YOUR PLANT AT OUR RISK!

Write today, on your letterhead, for more complete information.

MOREHOUSE-COWLES, INC.

1150 San Fernando Road, Los Angeles 65, California

Convenient Lease and Time Payment Plans • Representatives in Principal Cities.



Giant Cowles Dissolver of type used in processing fuel for great Polaris submarine missile.

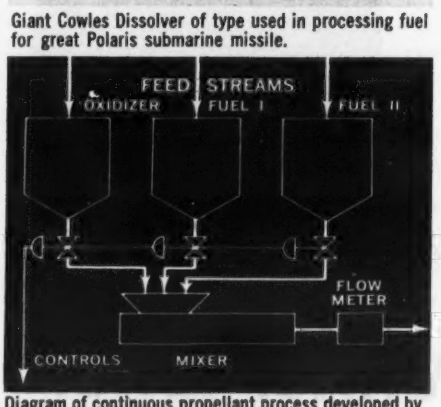


Diagram of continuous propellant process developed by Aerojet engineers.

821

Check 1056 opposite last page.

ment — can be used, also, for barites, gypsum, soda ash, fluorspar, talcum, hydrated lime, perlite and fly ash.

Advantages from system are flexible inventory control and labor savings.

(Pressure tank trailers, using Airslide* principle, are manufactured by Fruehauf Trailer Company, 10940 Harper Ave., Detroit 32, Mich.)

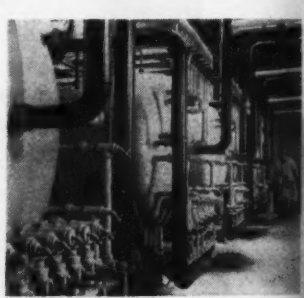
Check 1057 opposite last page.

*Fuller Co. trademark

Synthetic filter cloth helps cut sugar beet refining costs

Teams up with pressure-leaf units, saves labor

Problem: Cost of filtering sugar beet syrup was high at Union Sugar Division of Consolidated Foods Corp., Betteravia, Calif. Using conventional filtration equipment,



Battery of filters processing sugar beet syrup at Union Sugar

price per ton of beets processed was about 3.2 cents.

Downtime was excessive. Cloths had to be removed for cleaning once each eight hour shift. Continuous removal of cloth and washing in strong detergents ruined the fabric in short order.

Solution: The old filtration units were replaced by pressure-leaf equipment equipped with Dynel filter cloths. Woven of Union Carbide's modacrylic fiber, the cloths backed by metal plates form filter leaves, which can be easily removed by pull-out roller carriage slides.

The filter cloth permits

To page 62

DEIONIZED WATER

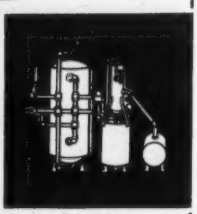
—from equivalent of distilled to 18 megohm quality

—from smallest laboratory to largest plant need

with these
ELGIN DEIONIZERS:

JUNIOR 120
Small mixed-bed type has exchangeable refill —delivers up to 2 gpm.
Ask for Bulletin 513

ULTRA-DEIONIZER
Large mixed-bed type delivers water of high quality in any quantity.
Ask for Bulletin 512A



MULTI-COLUMN
Any combination of anion and cation exchangers in sizes to meet any need.
Ask for Bulletin H4

Whatever the purity of water you need or the quantity you desire, Elgin can supply the correct type and size ion exchange equipment to deliver it. No requirement is too small—none too large for Elgin to handle efficiently. Whether it is a standard deionizer or one specially designed for the job, you are assured of expertly engineered equipment and trustworthy service for which Elgin has been known more than a half century.

The technical assistance of the nearest Elgin representative is as close to you as your phone.

Call or write for bulletins.

ELGIN SOFTENER CORPORATION
180 N. Grove Ave., Elgin, Illinois
Representatives in Principal Cities
In Canada: G. F. Sterne & Sons, Ltd., Brantford

Check 1058 opposite last page.

Bleach-plant Production

G. LEWIS

The tonnage passing through a paper-pulp bleaching tower is given by the equation:

$$P = \frac{0.3534\ h d^2 C}{R}$$

where:

P = production rate, tons of oven-dry fiber per 24-hr day
h = height of pulp in tower, ft
d = inner diam of tower, ft
C = consistency of pulp on oven-dry basis, %
R = time of retention of pulp in tower, min

Pulp density = 62.5 lb/cu ft

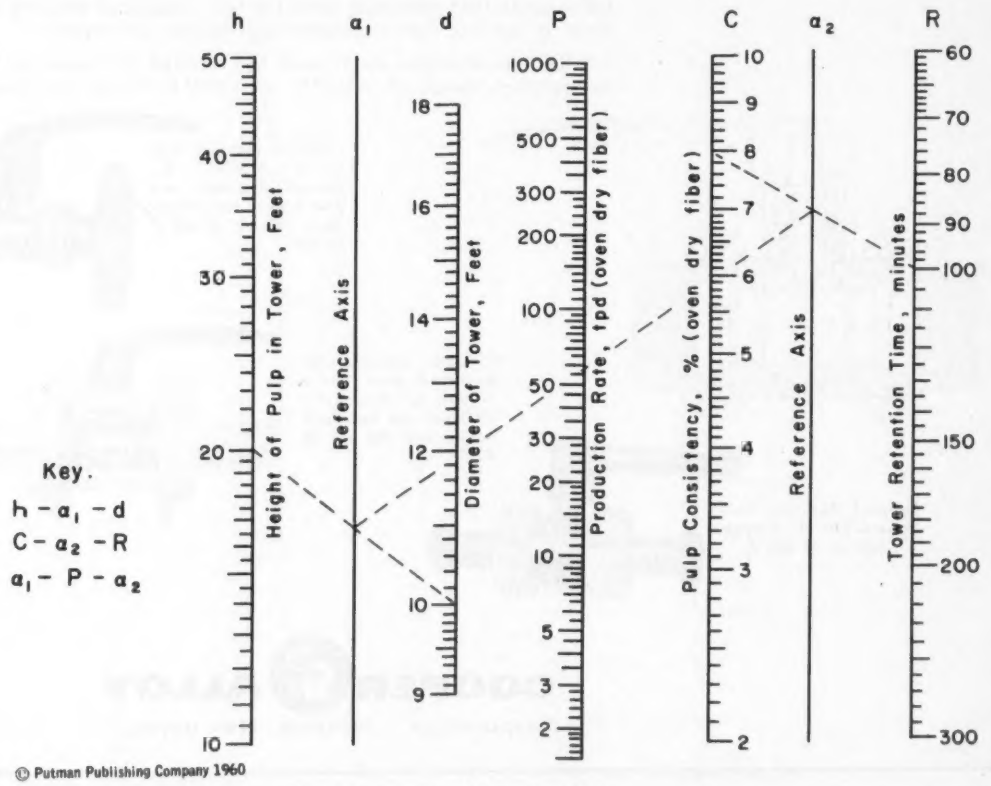
The accompanying nomograph, constructed by means of methods previously described[1], solves equation readily.

Typical Example

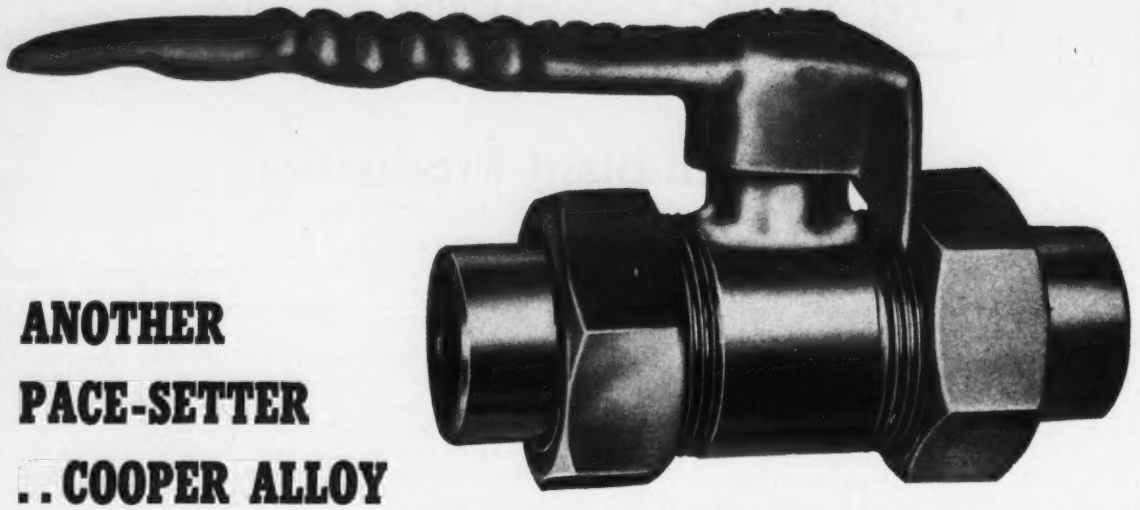
What is the production rate of a bleaching tower 10′ in diam if time required for color change to pass through tower is 100 min, pulp consistency is 8%, and pulp level is maintained at 20′ in tower? Connect 20 on h-scale and 10 on d-scale with straight line and mark intersection with the reference axis α_1. Connect 8 on C-scale and 100 on R-scale with straight line and mark intersection with reference axis α_2. Then connect two reference-axis intersections with straight line and read rate of production of bleached pulp as 56.5 tpd of oven-dry pulp.

LITERATURE CITED:

1) DAVIS, D. S., "Nomography and Empirical Equations," Chap. 6, Reinhold Publishing Corporation, New York (1955).



© Putman Publishing Company 1960



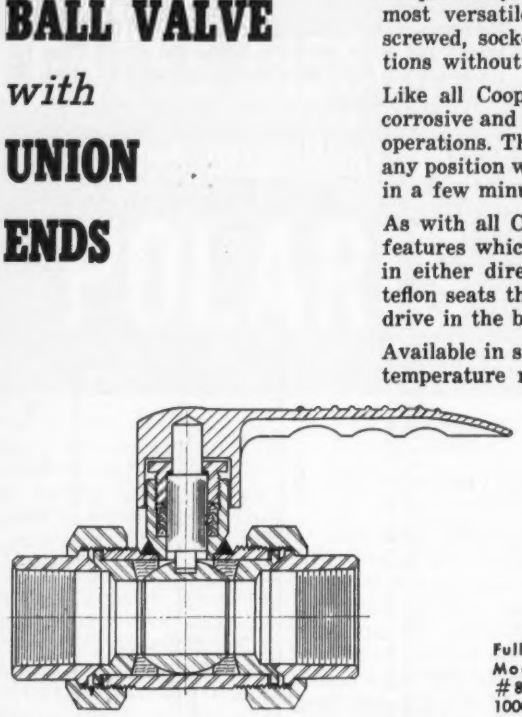
ANOTHER PACE-SETTER ..COOPER ALLOY BALL VALVE *with* UNION ENDS

Cooper Alloy Ball Valve #8001 with interchangeable union ends is the most versatile ball valve available. Ends are interchangeable with screwed, socket-weld, butt-weld, flanged Victaulic and special connections without need for complicated adjustments.

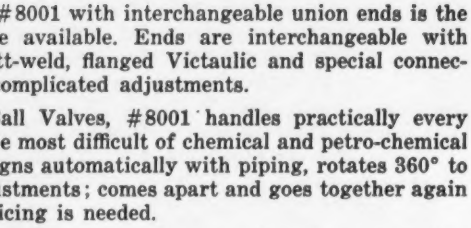
Like all Cooper Alloy Ball Valves, #8001 handles practically every corrosive and slurry in the most difficult of chemical and petro-chemical operations. This valve aligns automatically with piping, rotates 360° to any position without adjustments; comes apart and goes together again in a few minutes if servicing is needed.

As with all Cooper Alloy Ball Valves, this valve has the pace-setting features which include "Fullport" straight-through-no-turbulence flow in either direction; adjusting shims, extra deep stuffing box; broad teflon seats that eliminate need for "O" rings and positive slotted key drive in the ball that eliminates ball wobble and wear.

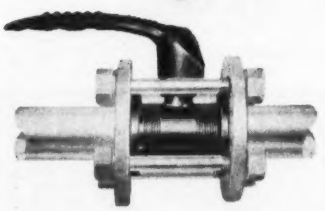
Available in stainless steel; sizes ½" through 2"; tested to 1000 psi in temperature range of −300°F. to +400°F. Write for Catalog BVF.



Fullport Sanitary Ball Valve #8207; 1" through 2"; 150 psi @ 400°F.



Fullport Flanged Ball Valve #8002; ½" through 2"; MSA and ASA face to face dimensions; 150 psi @ 400°F. service.



Fullport Compression Mounted Ball Valve #8009; ½" through 6"; 1000 psi cold non-shock service and 300 psi @ 400°F.

COOPER ALLOY

Corporation • Hillside, New Jersey

Check 1059 opposite last page.

NEW SOLUTIONS

From page 60

varying rates of flow without materially affecting clarity of product or length of filter cycle. Flow rates average up to 15 gal per sq ft per hr.

Results: Changing the systems has cut filtering costs from 3.2 down to 1.4 cents per ton of beets processed. Production has increased and downtime has been greatly reduced. Filters are sluiced every 24 hours with thin liquor at 60 psi followed by small quantity of water. Filters are thoroughly cleaned only once a week — compared to each 8 hour shift under previous arrangement.

Even when a filter is shut down, there is no great production loss. High capacity of filter cloth permits filter's load to be shifted to another unit. The fabrics stand up well to sluicing and to the detergents used for the weekly cleaning. If they become torn, they can be quickly darned with cotton yarn. Because of Dynel's long service life, total yardage consumed runs only about one percent of previous requirements.

(Dynel filter cloth is product of Textile Fibers Department, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y.)

Check 1060 opposite last page.

Pump holds up fine in over 3 years corrosive use

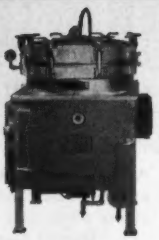
Casing, impeller, shaft made of type-20 stainless

Bismuth nitrate in excess corrosive nitric acid at ambient temperatures has satisfactorily been handled for over three years by stainless steel centrifugal pump at Metal and Thermit Corporation, Carteret, New Jersey. Constructed of type-20 stainless throughout (including casing, shaft and impeller), the pump has also on occasions, conveyed caustic solutions.

During all this time the only repair needed has been one replacement of the mechani-

To page 64

OU GET *Lower*
ACUUM PUMP
AINTENANCE *Costs*
and
ncreased Vacuum
with the
HILCO
IL RECLAIMER



HILCO
IL RECLAIMER
complete oil re-
ning. Removes sol-
acids and volatile
rities; moisture, sol-
ts, gases, etc. by
-vacuum process.

A simple, economical and efficient method of restoring contaminated lubricating and sealing oil to the full value of NEW OIL. The HILCO will produce and maintain oil free of solids, water, gums and acids in a continuous, all-electric, automatic operation.

Be Sure of CLEAN OIL in your
HIGH VACUUM PUMPS

KEEP YOUR HYDRAULIC
SYSTEM *Clean*
with

HILCO
HYDRAULIC
OIL FILTER

No More Varnish and Sludge Deposits
No More Flushing and Manual Cleaning
No More Frequent Oil Changes
No More Accumulation of Dirt
Filter life up to a year eliminates usual frequent draining, refilling of systems.

Write for complete details in the free bulletin at no obligation . . .

THE
HILLIARD Corporation
58 West Fourth St. Elmira, N. Y.
In Canada
UPTON-BRADEN-JAMES LTD.

Check 1061 opposite last page.

Alcohol Content of Ethanol-water Mixtures from Specific Gravities

GEORGE E. MAPSTONE
Johannesburg, South Africa

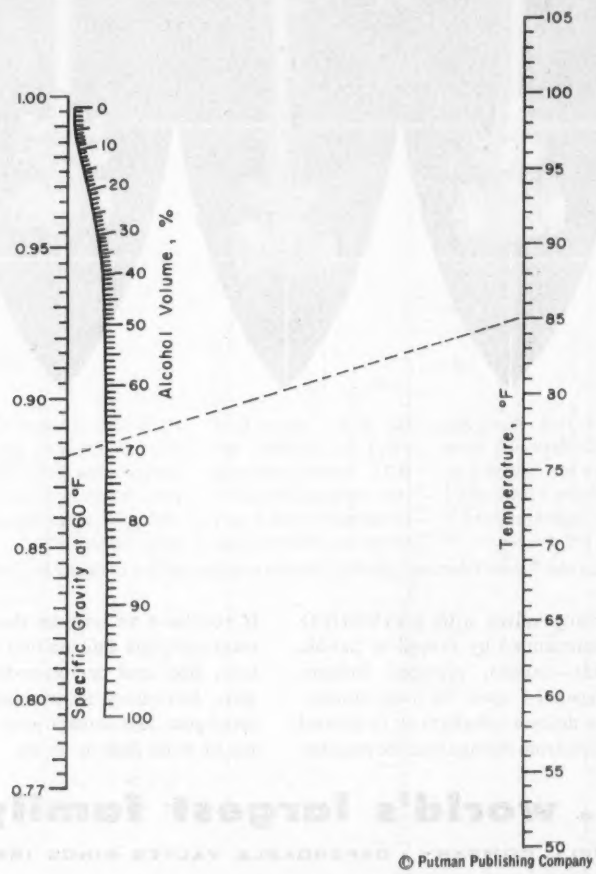
It is often necessary to determine ethanol content of aqueous alcohol. Many tables are available which relate specific gravity under different conditions to ethanol content of mixture. However, temperature coefficient of specific gravity is also a function of ethanol content.

Accompanying nomograph has been drawn to allow ready estimation of alcohol content from observed specific gravity and temperature . . . on basis of tabulated data for variations of both specific gravity at 60°F and the specific-gravity temperature coefficient with alcohol content.[1]

Typical Example

Use of the chart may be illustrated by means of an example: An alcohol-water mixture has specific gravity of 0.881 at 85°F. What is alcohol content? By means of straight line connect 0.881 on left-hand specific-gravity scale with 85 on right-hand temperature scale. This line cuts central alcohol content scale at 69% by volume.

LITERATURE CITED:
1) PLEETH, S. J. W., "Alcohol," Appendices VII & VIII, pp. 248-249, Chapman & Hall Ltd., London (1949).



© Putman Publishing Company 1960

Performance makes the world of difference

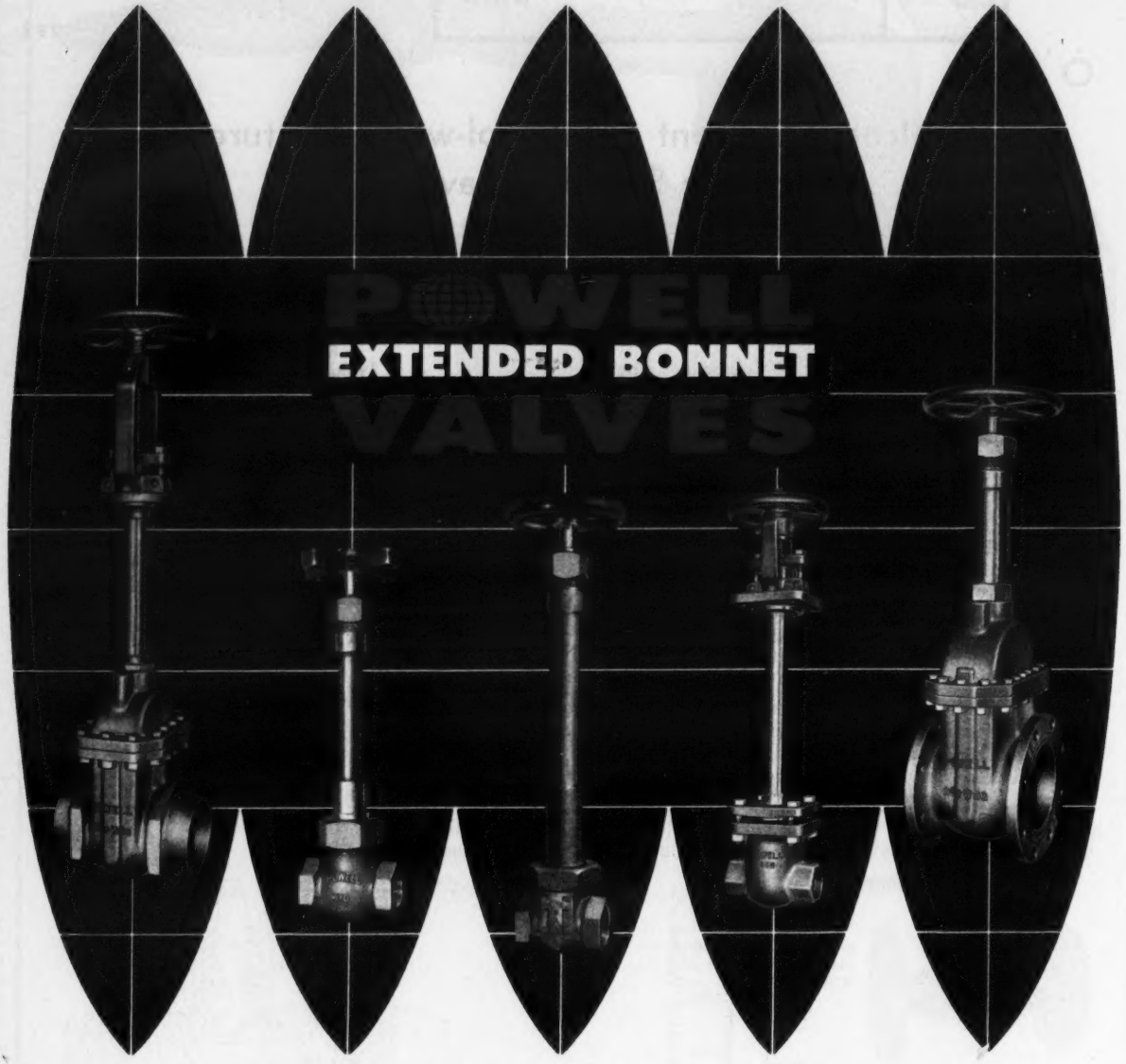


Fig. 70-1413—Bronze Gate Valve for 150 W.P., 200 W.O.G. Outside screw rising stem and yoke, extended bonnet, solid wedge disc, integral seats, socket ends.

Fig. 70-1175—Bronze Hydraulic Regrinding Globe Valve for 2000 W.O.G. Extended bonnet. Hard wear-resisting screwed-in seat ring and disc.

Fig. 70-375—Bronze Gate Valve for 200 W.P. 400 W.O.G. Inside screw rising stem, extended bonnet. Interchangeable solid or split wedge disc, integral seats.

Fig. 70-2490—Stainless Steel Gate Valve for 150 W.P., 400 W.O.G. Outside screw rising stem and yoke, extended bonnet, stainless steel solid wedge disc, integral seats, screwed ends.

Fig. 70-1401—Bronze Gate Valve for 150 W.P., 200 W.O.G. Inside screw non-rising stem, extended bonnet, solid wedge disc, integral seats, flanged ends.

These Extended Bonnet Valves are especially designed to control the flow of liquids and gaseous fluids.

Here are a few of the many valves with EXTENDED BONNET made and recommended by Powell to handle liquid and gaseous fluids—oxygen, nitrogen, helium, hydrogen, etc. They are depended upon for long, uninterrupted, leak-tight service in defense installations to control the flow of the propellant fuels from storage into the missiles.

If you have an unusual flow control problem, or if you want complete information on the Powell Line of bronze, iron, steel and corrosion-resistant valves—our metallurgists, laboratory technicians and engineers are ready to serve you. Just contact your nearest Powell Valve distributor or write directly to us.

Powell . . . world's largest family of valves

THE WM. POWELL COMPANY • DEPENDABLE VALVES SINCE 1846 • CINCINNATI 22, OHIO

Check 1062 opposite last page.

NEW SOLUTIONS

From page 62

cal seal. On similar pumps in other applications, seals also have stood up well in temperatures ranging from −150° to +450°F. The seal is simple

All-stainless steel centrifugal pump handles bismuth nitrate in excess nitric acid at Metal and Thermit Corporation

to inspect and easy to replace. They are available made of Teflon and ceramic, carbon and ceramic, and carbon and stainless steel or Stellite.

Impellers for the pumps are either fully-enclosed or semi-open design. They can be interchanged, requiring only that wear plate be substituted for wear ring when converting to semi-open type.

(Further information about Centri-Chem centrifugal pumps may be obtained from Eco Engineering Company, 12 New York Avenue, Newark 1, New Jersey.)

Check 1063 opposite last page.

WANTED: NOMOGRAPHS — WORTH $20 EACH!

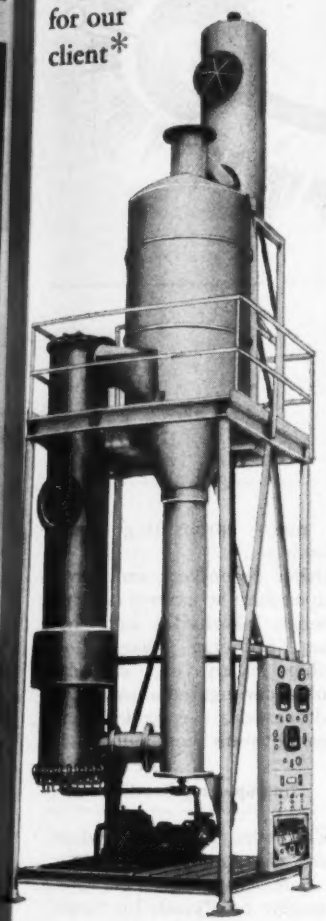
Do you have a pet nomograph that could save time for other CHEMICAL PROCESSING readers? If so, send it neatly and accurately drawn, with a double spaced, typewritten description to:

Data Editor
CHEMICAL PROCESSING
111 E. Delaware Place
Chicago 11, Illinois

We will pay $20 for each one accepted and published.

s EVAPORATOR

was custom-
gineered to do
a specific job
for our
client*



ur clients tell us how they want their
roducts. We design, build, and deliver
he equipment to do the job!

THERMOVAC will custom-engineer and fabricate the processing equipment best for your job!

• Evaporators • Heat Exchangers • Process Automation • Rotary Coil and Steam Jacketed Kettles • Specialized equipment for the Food and Chemical Industries.

ite or call for immediate service;
pert consultation!

Thermovac inc.

A SUBSIDIARY OF RHEEM MANUFACTURING CO.
816 East Hazelton Avenue
P.O. Box 209
Stockton, California

Check 1064 opposite last page.

CUT HERE AND FILE

Viscous Flow Problems

J. D. HOSKINSON, Plant Engineer
Hewitt-Robins Incorporated
Franklin, N. J.

This nomograph was constructed for use as a guide in selecting pipe sizes in pumping or transfer of viscous resins common to urethane-foam industry.

In practice turbulent flow of viscous liquids (e.g. 10,000 centipoises) is virtually unattainable. For example, a flow of over 10,000 gpm would be required through a 2″ pipe, of a liquid at 10,000 centipoises and specific gravity of 1, to develop a Reynolds number of 2000. Since roughness of pipe has practically no effect on true viscous flow (except as roughness reduces effective cross-sectional area), Poiseuille's formula is applicable to the flow problems for which this chart is intended.

In modified form this formula may be stated as:

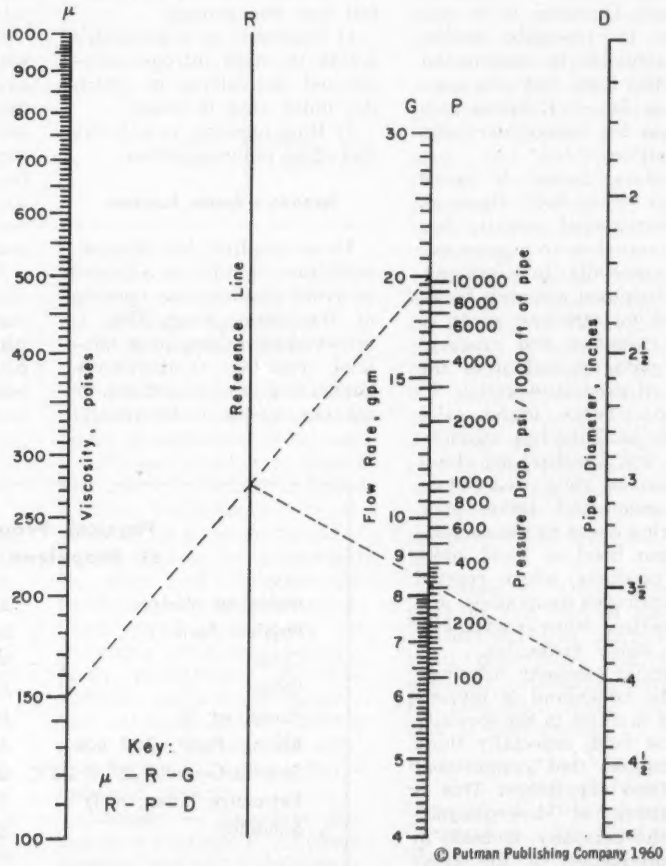
$$P = \frac{27.3\,\mu\,G}{D^4}$$

where:

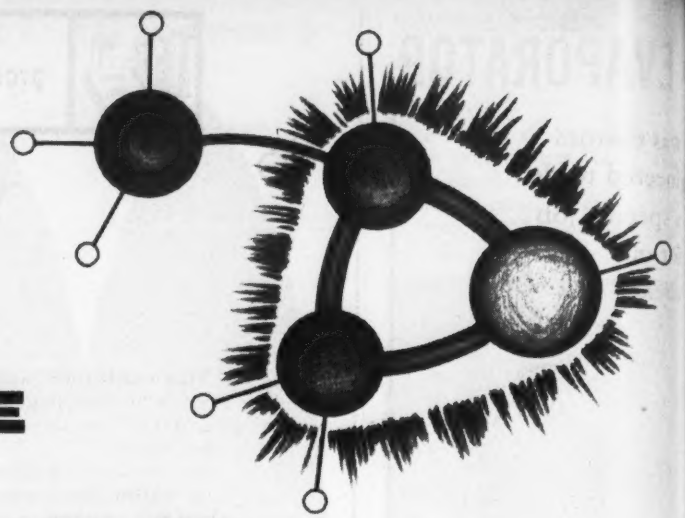
G = rate of flow, gpm
D = pipe diam, inches
μ = viscosity, poises
P = pressure drop, psi/1000′ of pipe

Typical Example

Find the pressure drop through 1000′ of four-inch-diam pipe of a liquid having viscosity of 150 poises and flowing at 20 gpm. Connect 150 on μ scale with 20 on G-scale. Mark intersection of this line on reference line. Connect this point with 4 on D-scale. This intersects P-scale at a pressure drop of 319 psi for 1000′ of pipe.



© Putman Publishing Company 1960



Commercially available propylene imine contains very reactive three-membered imine ring

PROPYLENE IMINE

...opens new horizons for the imaginative chemist

Little is known about the commercial application of propylene imine and its derivatives. However it is well known in research circles. Now available in commercial quantities from just one company so far — it opens new horizons for many interesting applications.

Ethylene imine is more familiar to the field. Research and commercial activity has been carried on to a great extent, especially in Germany. Literature and research background on ethylene imine is quite extensive and much of these data are useful in the study of propylene imine.

Propylene imine (also known as 2-methyl ethylenimine and 2-methyl aziridine) contains a very reactive three-membered imine ring. This ring opens at the carbon-nitrogen bond to yield addition products when reacted with hydrogen compounds, and polymerizes when reacted with other imine molecules.

Supplier company introducing the compound is investigating markets in the specialty organic field, especially those applications that complement its broad experience. This is a pattern of diversification and the company is basic in the production of the compound. It is not an extension of present product technology but is a new area of activity.

Reactions of propylene imine fall into two groups:

1) Reactions as a secondary amine to yield nitrogen-substituted derivatives in which the imine ring is intact.

2) Ring-opening reactions including polymerization.

Secondary Amine Reaction

To accomplish this reaction, conditions should be adjusted to avoid simultaneous opening of the imine ring. This is achieved by maintaining minimal reaction temperatures, conducting the reactions in alkaline media or by removing any acid produced through use of a suitable acid acceptor such as tertiary amines or caustic.

Reaction of propylene imine with acid chlorides results in amides containing a cyclic imine structure. These compounds undergo the imine ring-opening reaction more readily than propylene imine itself and as a consequence such derivatives may find wide usage.

Reaction with such acid chlorides as sulfonyl chloride, carboxylic acid chlorides, phosphorous oxy chloride, phosphorous thiochloride, phosphonitrilic chloride trimer and cyanuric chloride result in many interesting compounds.

Other secondary amine reactions may be carried on with ketenes, aldehydes and ketones, quinones, isocyanates, isothio cyanates, carbodiimides, conjugated unsaturated hydrocarbons, epoxides and organolithium compounds.

Ring-opening Reactions

The imine ring of propylene imine is stable in basic media. In contrast, ring opening is strongly catalyzed by acids, and in concentrated imine solutions the acid-catalyzed ring opening can proceed with explosive force.

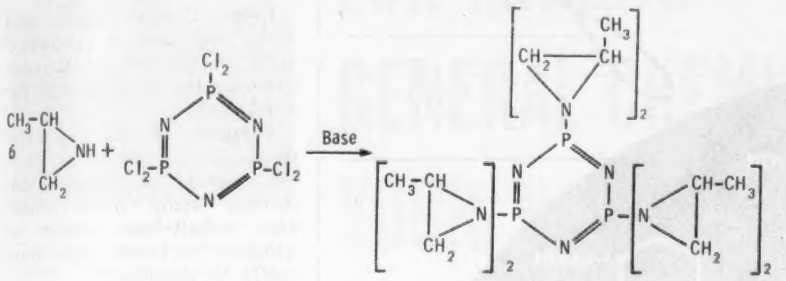
Ring-opening reactions may be effected by hydration, carboxyl groups, alcohols, sulfur acids, hydrogen sulfide, sulfhydryl groups, carbon disulfide, xanthates, amines, peroxides, and benzene.

Three of Many Propylene Imine Reactions

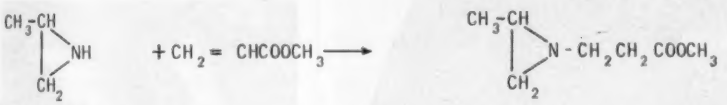
1) Propylene imine reacts with phosphonitrilic chloride trimer, replacing all six chlorines with cyclic imine groups. Reaction has been conducted in the laboratory in benzene solution at room temperature, using the organic base triethylamine.

Physical Properties of Propylene Imine

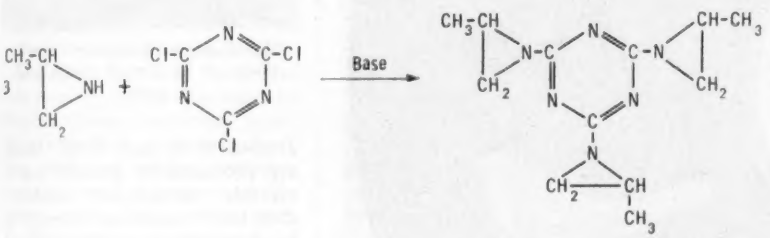
Molecular Weight	57
Physical Form	Liquid
Color	Water White
Odor	Ammoniacal
Purity, wt %	Min. 95%
Boiling Point, 760 mm	66-67°C
Specific Gravity, 25° + 25°C	0.79
Refractive Index, $n^{25}D$	1.4094
Solubility	Soluble in water and most organic solvents.



Reaction of propylene imine with phosphonitrilic trimer replaces all six chlorines with cyclic imine groups



Propylene imine reacts with α, β-unsaturated compounds in Michael-type reaction



Imine derivative contains the triazine ring

2) Propylene imine will react with α, β-unsaturated compounds in a Michael type addition to yield a corresponding N-substituted imine derivative. Reaction has been conducted with such compounds as methyl acrylate, acrylonitrile and hexahydro-1,3,5-triacrylyl-s-triazine.

3) Propylene imine reacts with cyanuric chloride to give tripropylene melamine. The secondary imine provides a simple way of reacting with a chlorine-containing compound. This leaves a reactive imine ring in the final compound for ring opening.

Many Derivatives

A variety of derivatives can be made from the basic material.

A) MAPO, a highly reactive tri-functional imide, its chemical name is tris [1-(2-methyl) aziridinyl] phosphine oxide.

B) MAPS is tris [1-(2-methyl) aziridinyl] phosphine sulfide with reactivity and properties similar to MAPO.

C) Phenyl MAPO is phenyl bis [1-(2-methyl) aziridinyl] phosphine oxide. It is difunctional counterpart of MAPO. This difunctionality makes possible chain extension of polymers with two carboxylic acid groups.

Materials cured with this compound have better elastomeric properties than those cured with the tri-functional MAPO. Blends of MAPO and phenyl MAPO can be used to give balance between chain extension and cross-linking.

Potential Applications of Propylene Imine

Paper Manufacture — Polyalkylenimines are useful in paper manufacture to be used as a beater additive to impart wet and rub strength to paper without impairment of absorbency. It cures on the alkaline side, acts as a mordant for dyes and increases the freeness of the pulp to permit more rapid de-watering on the paper machine and thus a faster production rate. Absorbency and strength properties of imine-treated papers make them particularly suitable for towels, napkins, bandages and gaskets.

Coatings — Excellent adhesion of coatings to cellulosic material and wet cellulosics is possible by incorporating with the coating the reaction product of an imine. Incorporation of imine compounds in synthetic resin systems is also an effective means of improving the adhesion of the coating to glass fibers and to provide permanent resistance to immersion in water as well as to mechanical treatments.

Textiles — Imines, their derivatives and imine polymers will find use in many phases of textile processing. Improved fixation of pigments on fibers has been obtained by the use of imine derivatives as additives to the pigment binder. N-substituted derivatives of alkylene imines have been used to improve the abrasion-, water-, acid- and alkali-resistance of cellulosic and other fibers.

Treatment of cotton with imine polymers results in more even dyeing with sulfur dyes. Raw cotton treated with monomeric imines has enhanced the affinity of cotton for acid dyes.

Amino-alkylated cellulose reacted with imine yields a product with fibrous character highly resistant to aqueous acids and exhibits ion-exchange properties. Waterproofing of fabrics can be accomplished with certain imine compounds.

Alkylene imine derivatives are useful as inhibiting agents for gas fading. Polymerization products of ethylene imine have been utilized in the textile industry as disinfectants and preservatives. Shrink-proofing and felt-proofing of protein fibers, especially wool, can be accomplished by treatment of the fiber with an epoxy resin and a polyalkylenimine.

General — Other applications in the field of plastics, rubber processing, pharmaceuticals, insecticides and others open up interesting horizons for propylene imine and its host of derivatives.

(Propylene imine is a product of Commercial Development Department, Interchemical Corporation, 67 West 44th Street, New York 36, N. Y.)

Check 1065 opposite last page.

call Reilly

REILLY TAR & CHEMICAL CORPORATION

MERCHANTS BANK BUILDING, INDIANAPOLIS 4, INDIANA

SALES OFFICES IN PRINCIPAL CITIES

Check 1066 opposite last page.

Do-it-yourself carbides resistant to heat and corrosion

Uses: Carbide parts and tools may now be produced right in the shop with only conventional tools needed for machining.

Features: Product permits do-it-yourself carbides. Thus, design and tool engineers can fashion many items where cast cobalt-base alloys or tungsten carbides might normally be employed.

Description: Steel — bonded carbides are available in two grades, S-45 and S-55. Both are produced by powder metallurgic techniques, embedding tiny crystals of extremely hard titanium carbide in a relatively soft matrix of stainless steel.

Machinable carbides permit many shapes to be formed quickly and easily

Resultant composite retains properties of both of its constituents. It has machinability and resistance to heat and corrosion of stainless steel, and ultra-hardness of titanium carbide.

(Ferro-Tic S-45 and S-55 are products of Sintercast Division, Chromalloy Corporation, 132 Woodworth Avenue, Yonkers 2, New York.)

Check 1067 opposite last page.

Synthetic rubber latex can replace natural rubber in foams

Uses: Product is designed for manufacture of foam rubber products.

Features: Special manufacturing process permits concentration of latex to 68% solids without thickening. It can be used as a complete re-

Free-flowing characteristics of "chemically agglomerated" synthetic rubber latex (right) compared to another latex containing the same high amount of rubber

placement for natural rubber in foam products. A stable price, well below current natural latex levels, has been said to ease the problems of foam manufacturers who are currently faced with erratic price fluctuations and tight supplies on the natural latex rubber market.

Description: A special manufacturing process enlarges the size of rubber particles in this styrene-butadiene latex. By "chemical agglomeration" the synthetic rubber particles are increased to approximately three times their usual size. This permits an increase in concentration of latex up to 68% solids while still maintaining the free-flowing qualities necessary for foam manufacture.

Extensive tests and continuous foam production runs have shown that the latex has uniformity, and foam products made from it equal natural foam in resilience, compression modulus and durability.

(Naugatex J-8174 synthetic rubber latex is the product of Naugatuck Chemical Div., United States Rubber Co., 1230 Avenue of the Americas, New York 20, N.Y.)

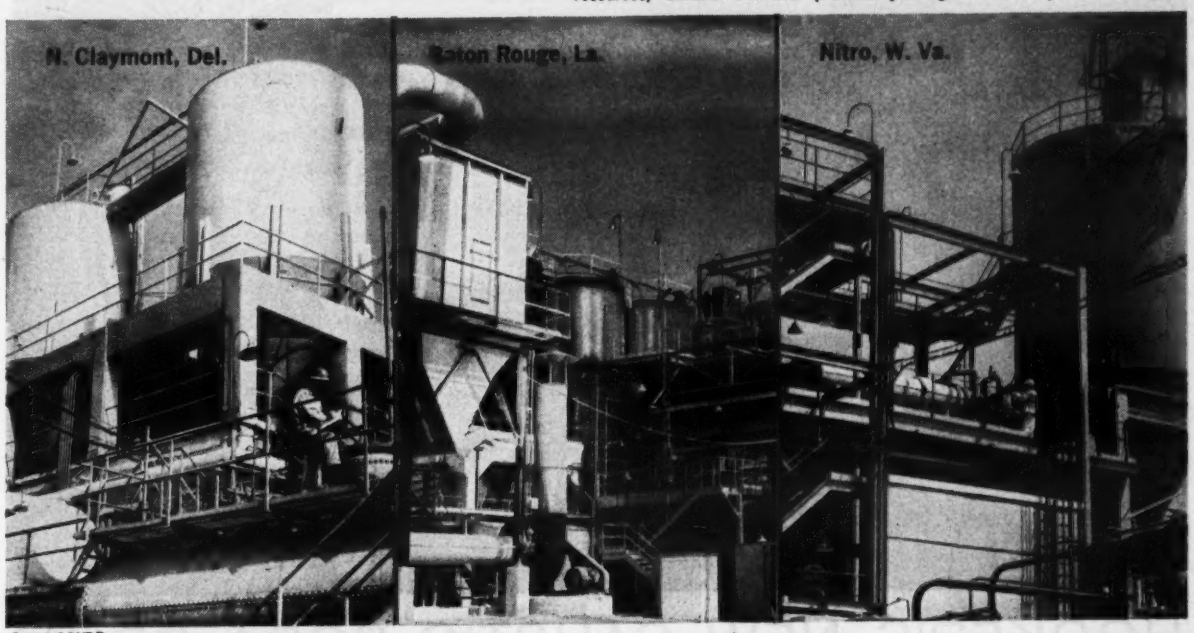
Check 1068 opposite last page.

Preserving foods that are neutral or slightly alkaline is the problem covered in 10-page booklet which covers methods of use, determination and properties of Parasepts. Bul PSPT 3-60 — Heyden Chemical Division, Heyden Newport Chemical Corporation.

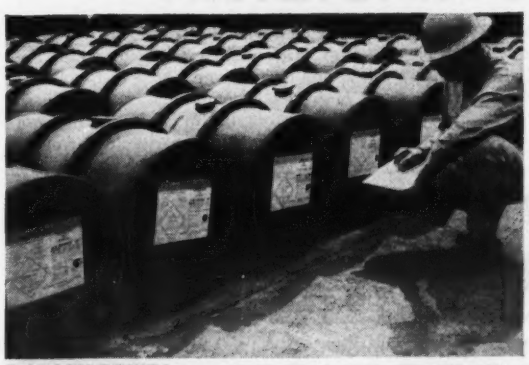
Check 1069 opposite last page.

BASIC REASONS FOR MAKING GENERAL CHEMICAL YOUR "HQ" FOR HF

EXTENSIVE FLUORSPAR RESOURCES. Basic to the point of owning large fluorspar reserves as well as mines and mills, General Chemical is the nation's leading producer of hydrofluoric acid. By controlling its raw material resources, General Chemical protects you against interruptions of supply.



3 PLANTS. General Chemical produces anhydrous and aqueous hydrofluoric acid at the following three locations: North Claymont, Delaware; Nitro, West Virginia; and Baton Rouge, Louisiana.



5 STOCK POINTS. General has five bulk storage and packing stations in the United States for aqueous HF. Each backs up the others—assuring availability and prompt service at all times.

With its outstanding resources for essential raw materials—fluorspar reserves, mines and mills—plus a broad network of 18 sulfuric acid plants, General Chemical's *basic* position in hydrofluoric acid production is unmatched.

What's more, General is the *only* supplier offering shipment of hydrofluoric acid from more than one producing location. It supplies *anhydrous* and *aqueous* HF to its customers from *three* producing works and *aqueous* HF from an additional *five* company-owned locations.

Whenever and wherever you need hydrofluoric acid, call on General Chemical—your "HQ" for HF!

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

Check 1070 opposite last page.

HOOKER'S NEW CAUSTIC SODA DRUM FLIPS OPEN, EMPTIES EASIER

You don't need a tool kit to open Hooker's *new* caustic soda drum. Flip the snap-lock and it's open. Flip it the other way and it's closed.

It's easier to get at the soda because the drum has a *full* open head—21 inches across.

The soda pours smoothly when the drum is tipped. There's no rim to catch and hold it; no waste.

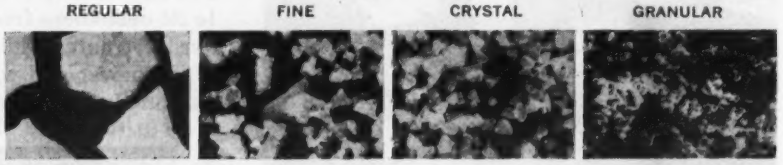
The improved seal keeps out moisture, too.

Since the drum mouth is bigger, it's easier to re-use the drum after it's empty.

Yet this 400-450-pound capacity drum is standard. There's no price boost or premium. It's another advance from Hooker, who first supplied 18-inch-mouth drums as standard.

Nevertheless, the contents are still your prime concern. Hooker's caustic soda is of uniform quality. Flake thickness and size don't vary from batch to batch.

Hooker's caustic soda is available in four sizes: regular, fine, crystal and granular. Specify flake size when ordering.



HOOKER CHEMICAL CORPORATION
511 FORTY-SEVENTH STREET, NIAGARA FALLS, NEW YORK

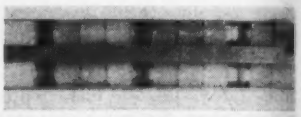
HOOKER CHEMICALS PLASTICS

Check 1071 opposite last page.

Weather-resistant film of polyethylene now possible

Uses: Formulation permits formation of film expected to increase usefulness of polyethylene in such outdoor applications as greenhouses, mulches, storage and machinery covers.

Features: Resin incorporates a non-pigment ultraviolet inhibitor added during production to insure homogeneous dispersion and complete protection of extruded film. Film only five-mils thick has withstood two years of weathering with little loss of strength.



Samples of stabilized polyethylene, 1/8" thick (lower rack) compared to unstabilized product (upper rack) in outdoor exposure. Unexposed sample is on the left. Succeeding groups have been exposed for one, three and five years

Description: Product is a stabilized polyethylene formulation. In weathering tests recently completed, 50-mil sheet of material showed a retention of 88% of original percent elongation after three years of outdoor exposure. Heavier sections (125 mils) still retain their good appearance after five years. Material carries a slight premium price.

(Stabilized Tenite Polyethylene is a product of Eastman Chemical Products, Inc., Subs. of Eastman Kodak Co., 260 Madison Ave., New York 16, New York.)

Check 1072 opposite last page.

Polyvinyl butyral resin has low tack and high adhesion

Uses: Suggested areas of application include aqueous-based baking primers, decorative and protective coatings for metal, wood, glass, and other materials. It can also be used in textile finishing, as a

binder for non-woven fabrics, and grease proof or washable coatings for paper and textiles.

Features: Tensile strength of dried film is about twice that of manufacturer's standard product. It has a low tack, good abrasion resistance, and high film strength with high adhesion.

Description: Resin D-566 is a plasticized dispersion of high viscosity polyvinyl butyral resin. It can be combined with water-soluble or water-dispersible thermosetting resins. Upon drying at elevated temperatures, it produces thermoplastic films having high adhesion to porous and nonporous surface. Films dried at room temperature are strippable, non-tacky, continuous, and water resistant. Plasticizer used is non-migratory and gives the film good heat and color stability.

(Resin D-566 is product of Dept. HO, Shawinigan Resins Corporation, Springfield, Massachusetts.)

Check 1073 opposite last page.

Excellent color provided by leveling agent for polishes

Uses: Leveling agent was developed especially for polymer emulsion polishes. It is particularly well suited for use with acrylic and styrene emulsions.

Features: Product produces a film of excellent clarity and brilliance that is resistant to water spotting and permanently removable.

Description: Leveling agent, Shanco L-1159, is a pale, high-melting, alkali soluble resin. It is applicable to high wax, buffable emulsion formulations in the range of 8 to 18%. Resin dissolves readily with ammonia or amine producing light colored, fluid solutions. Melting point is 168-178°C and acid value is 185-195.

(Shanco L-1159 is product of Shanco Plastics & Chemicals Inc., 2716 Kenmore Ave., Tonawanda, N.Y.)

Check 1074 opposite last page.

Amino-Hydrogen Substitution (e.g. Alkylation, cyanoethylation, carboxyethylation). Secondary amines formed, but "steric control" retards tertiary amine formation.

$$t\text{-}RNH_2 \longrightarrow t\text{-}RNH\text{—}R'$$

Straight-chain amines give a mixture of secondary and tertiary amines.

Reaction with Aldehydes.

$$t\text{-}RNH_2 + R'CHO \longrightarrow t\text{-}RN = CHR'$$

stable aldimine

Straight-chain amines and aldehydes normally give unstable derivatives.

Oxidation.

$$t\text{-}RNH_2 \xrightarrow{KMnO_4} t\text{-}RNO_2$$

Straight-chain amines give complex, unpredictable products.

Preparation of t-Alkylcyanamides.

$$t\text{-}RNH_2 \xrightarrow[NaOH]{Cl_2} \left[t\text{-}RNHCl\right] \xrightarrow{NaCN} t\text{-}RNH\text{—}CN$$

With straight-chain amines, this reaction requires close control, since the cyanamides react further in alkaline medium to form complex products.

ROHM & HAAS t-ALKYL AMINES

Primene 81-R: 12-14 carbon t-alkyl primary amine
Primene JM-T: 18-22 carbon t-alkyl primary amine
t-Butylamine **t-Nonylamine**
t-Octylamine **Menthane Diamine**

PRIMENE *is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.*

Rohm & Haas

t-ALKYL AMINES...

for "Steric Controlled" reactivity

In many reactions, t-alkyl primary amines show unusual reactivity not exhibited by the straight-chain isomers. Why?—"Steric Control", resulting from the attachment of the amino group to a tertiary carbon in the t-alkyl amines makes the big difference. Four reactions that demonstrate the effect of this structural difference are given at the left.

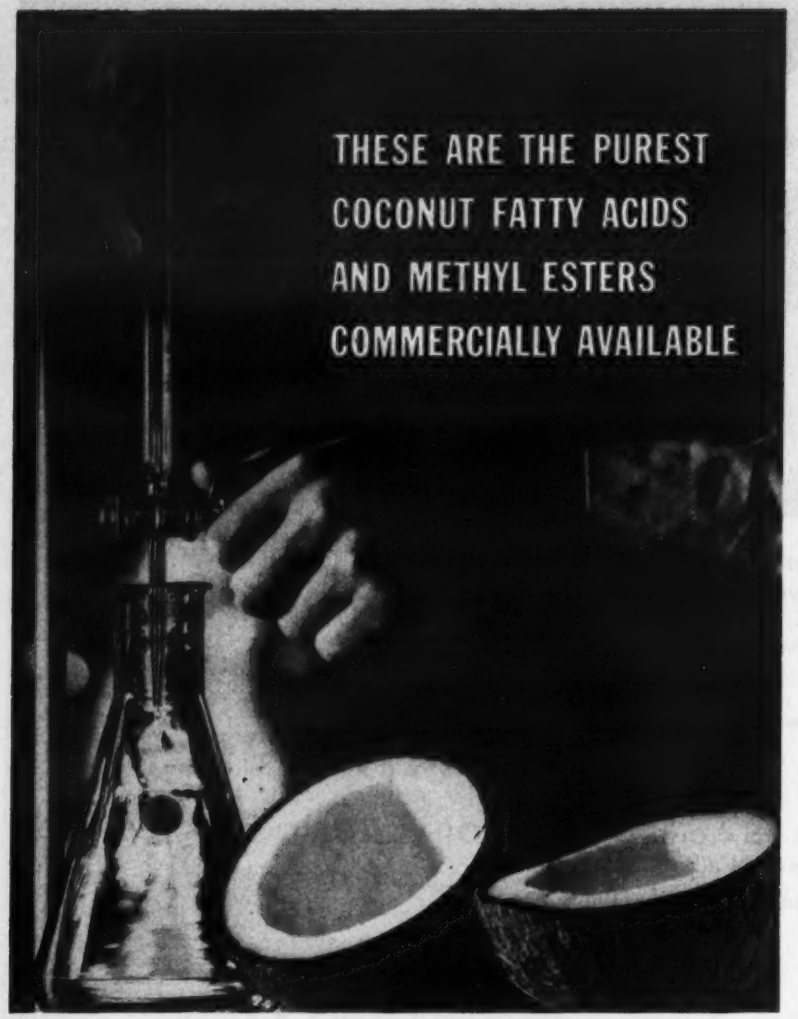
Why not explore further the potential of these amines? Write to Dept. SP-16 for samples and a 44-page book giving many more t-alkyl amine reactions.

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Check 1075 opposite last page.



At Foremost-El Dorado, where we concentrate on manufacturing coconut fatty acids and methyl esters exclusively — purity is foremost. We produce the purest commercially available. For example, our Lauric and Myristic acids and esters are over 98% pure. More important, these high standards of purity are constantly uniform. Reason why hundreds of companies from coast to coast have been depending on Foremost-El Dorado shipments for over 65 years. We ship to your requirements — in drums, bags, and in tank cars. Also mixed compartment tank cars of acids and esters. Supplies near you to meet your deadline.

If you have any unusual requirements, let our representatives work with you. For the Foremost-El Dorado Agent in your area, write, wire or phone: Department CP-1160

COCONUT FATTY ACIDS		COCONUT METHYL ESTERS	
Caprylic	*Palmitic*	*Caproate*	*Palmitate*
Capric	*Cocoleic*	*Caprylate*	*Oleate*
Lauric	*Eldhyco**	*Caprate*	*Eldo* 18*
Myristic	*Coconut*	*Laurate*	*Coconate*
		Myristate	

*T. M. Reg.

Foremost EL DORADO

FOREMOST FOOD AND CHEMICAL COMPANY

P. O. BOX 599 • OAKLAND 4, CALIF.

Check 1076 opposite last page.

CHEMICAL MATERIALS

Efficient catalytic activity and high-molecular weight polymers result from use of newly commercialized chemical family . . .

Di-peroxide derivatives go farther as catalysts

A new family of commercialized di-peroxide derivatives provides some rather unusual properties. Action is different than the mono-peroxides in that the hydrogen molecule breaks down in two steps, each at different energy levels.

Being di-functional, these derivatives are unique and contain two peroxide groups in each molecule. Compared with conventional mono-peroxides, they are more efficient catalysts, requiring ¼ to 1/5 the quantity of catalysts in many systems.

Available now is Lupersol$_R$ 101, technical 2,5-dimethyl-2,5-di(t-butylperoxy) hexane. Experimentally available shortly will be Lupersol$_R$ 130, 2,5-dimethyl-2,5-di(t-butyl peroxy) hexyne-3, a higher temperature liquid catalyst. Both compounds will be made available as solids absorber on a filler.

Lupersol 101

A stable, active, high temperature peroxide ($C_{16}H_{34}O_4$) used as a liquid initiator and may be conveniently handled, stored and used, either as a pure product or in combination with various fillers or reinforcing agents. It is reasonably inert to its environment and will work well in the presence of acid or basic carbons or clays.

Cross-linking of polyethylene permits milling or compounding of the polymer at temperatures up to 270°F.

For polyester pre-mix and diallyl phthalate molding compounds Lupersol 101 can be used at lower catalyst concentrations, exhibits a long catalyzed resin shelf life and permits molding at higher temperatures. During formulation and compounding, processing temperatures of 160° or 180°F are possible.

Since Buton resins (CHEMICAL PROCESSING page 42, February 1960) require higher temperatures to polymerize, the di-peroxides work very well here. Also a smaller quantity is needed. Usually only 1/3 to 1/5 the normal quantity required is needed as compared to conventional types.

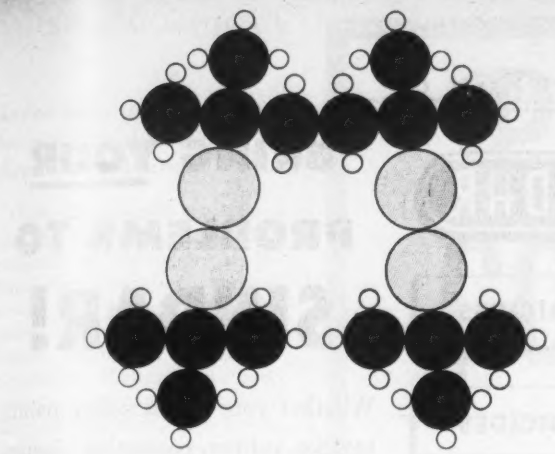
When used as a curing agent for Oxiron resins (CHEMICAL PROCESSING page 28, July 1960), a markedly less quantity of Lupersol 101 is necessary as compared to conventional types.

Furthermore, the end product is non-odorous as compared to one cured with dicumyl peroxide.

Lupersol 130

A higher temperature liquid catalyst ($C_{16}H_{30}O_4$), this acetylenic analog of Lupersol 101 has a half life of 8.2 hr at 130°C compared to 2.8 hr at the same temperature for Lupersol 101.

It is suitable for cross-linking of linear polyethylene where high temperatures are required for compounding. It can be used in commercial compounding equipment at temperatures up to 290°F under normal cycles without scorching. It is one of the highest temperature peroxides in existence and its major use in the near future is in this cross-linking activity.



Di-functional peroxide contains two peroxide groups in each molecule

The temperature level at which Lupersol 130 can be used is a bit ahead of most present polymer technology and is at the upper level of commercial use except for cross-linking applications. Cross-linked linear polyethylene made with this peroxide produces a polymer that retains most of its cold temperature properties up to 120°C or the crystalline melting point of the particular polyethylene. For example, carbon reinforced polyethylene pipe will stand this temperature with breakdown occurring as a softening rather than as melting.

A 30 day test at 95°C and 1000 psi of ¾" schedule 40 pipe made of 2/3 carbon and 1/3 linear polyethylene showed no signs of failure. No indication of environmental stress cracking appeared.

Generally, cross-linked polymers become more elastic, and the material such as polyethylene will not creep, but rather after loading will return to its original shape if the yield point has not been exceeded. With this gain in elasticity comes freedom from environmental stress cracking, increased abrasion resistance, greater impact strength, lower brittle points and greater tensile strength.

High Molecular Weight Polymer Possible

Used in polymerization systems, these di-peroxides have the unique property of producing longer than normal polymers by initiating chain growth from both ends of the molecule. Through this stepwise breakdown (or diradical action) of the di-peroxides, the polymer produced has a higher average molecular weight than that made with mono-peroxidic catalysts and also has a broader molecular weight distribution giving enhanced processing characteristics for many polymers. A discreet temperature range is required for this to occur. At lower temperatures, the peroxide behaves as a monoradical generating compound and at higher temperatures, the thermal polymerization effects mask the affects of the di-peroxide catalysts. Because different polymer systems require different temperature levels, a number of other di-peroxides with differing thermal properties will be made available in the future.

(Di-peroxide derivatives are available from Lucidol Division, Wallace & Tiernan, Incorporated, 1740 Military Rd., Buffalo 5, N. Y.)

Check 1077 opposite last page.

In Which of These Industries or Processes can NALCO 680 SODIUM ALUMINATE ($Na_2Al_2O_4$) Be Put to Work?

CHEMICAL PRODUCTION
LION TAMING
DETERGENT MANUFACTURE
GLASS and CERAMICS
PAINTS and PIGMENTS
CEMENT and MORTAR
PHARMACEUTICALS
PULP and PAPER MAKING
RUBBER
BASKETWEAVING
TEXTILES
WATER TREATMENT

As far as we know, only lion tamers and basketweavers don't use much Nalco 680 sodium aluminate. All the other industries listed do. So do many others. Nalco 680, a low-cost source of high purity alumina, offers many advantages as a chemical intermediate, including:

High alumina content—average 46% Al_2O_3.
Excellent stability—careful production processes, plus special stabilizers, maintain high stability while retaining an optimum Na_2O/Al_2O_3 molecular ratio of 1.15/1.
Purity—iron content is approximately .01 per cent; silicon, .02 per cent; and only trace levels of calcium, magnesium, and tin.
Low corrosivity—Nalco 680 sodium aluminate solutions are alkaline, making stainless steel or rubber/plastic/lead lined equipment unnecessary. Also, when Nalco 680 is used with alum to produce alumina, NaOH from the sodium aluminate reduces alum-produced sulfuric acid.
Multiplicity of uses—Nalco 680 is a chemical intermediate of many uses. Some of the many compounds which can be made from 680 are: aluminum stearate, aluminum acetate, free alumina, acid alumina sols, aluminum hydroxide, paint gels, aluminum hydrates, and aluminosilicate zeolites.
Handling/shipping ease—Nalco 680 is easily and rapidly dissolved in water. Its high concentration means that less 680 is needed per process, saving warehouse space and reducing shipping expense.

The foregoing is only a brief description of the uses and advantages of Nalco 680 sodium aluminate. For complete information write for a copy of Nalco Bulletin K4. Or, call your local Nalco field representative. Even if you weave baskets or tame lions, you may find a use for Nalco 680—researchers are finding so many new uses for it that we'd be reluctant to say definitely that there's any industry or process in which it can't be used in some way.

NALCO CHEMICAL COMPANY
6294 West 66th Place Chicago 38, Illinois
Subsidiaries in England, Italy, Mexico, Spain, Venezuela, and West Germany Germany
In Canada—Alchem Limited, Burlington, Ontario
... Serving Industry through Practical Applied Science

Nalco CHEMICALS

Check 1078 opposite last page.

Fast Accurate Sulfur ANALYSIS

PETROLEUM PRODUCTS
iron steel
ORGANIC CHEMICALS
WOOD COAL
stainless alloys
COKE MINERALS
non-ferrous metals

with a

DIETERT-DETROIT Sulfur Determinator

Extremely simple direct-reading burette. No involved measuring or computing. Provides fast accurate analysis of sulfur content in scores of materials. Low cost, durable, easily maintained. Widely used in company laboratories and institutions of every description.

Dietert-Detroit Sulfur Determinator No. 3104, with combustion Furnace.

SEND FOR FREE CATALOG!

16 page Dietert-Detroit Catalog illustrates and describes both Sulfur and Carbon Determinators and complete line of accessory equipment and supplies.

HARRY W. DIETERT CO.
CONTROL EQUIPMENT
9330 ROSELAWN DETROIT 4, MICHIGAN

Send me your Carbon-Sulfur Determinator catalog.

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

Check 1079 opposite last page.

CHEMICAL MATERIALS

Greater stability given polyolefin plastics by UV absorber

Concentrations as low as 0.5% provide protection

Uses: Absorber is designed specifically to light-stabilize polyolefin plastics.

Features: Even at absorber concentrations as low as 0.5%, low-density polyethylene retains 60% elongation after four months exposure to severe sun conditions in Arizona. High-density polyethylene retains 88% elongation after similar exposure.

Light absorber maintains polyethylene's flexibility. Unprotected sample on left was exposed to Arizona sunlight for only a month. Protected sample on right remains flexible even after four months exposure

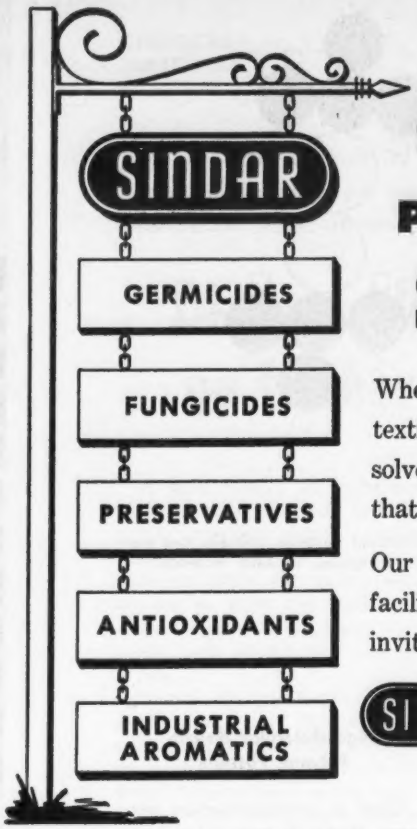
Absorber is stable and does not migrate. Approximately 90% remained in both high- and low-density polyethylene during these exposure tests.

Description: Chemically,2,2'-dihydroxy-4-*n*-octoxybenzophenone, Cyasorb UV 314 is a pale yellow powder that absorbs strongly in the 300-375 millimicron range of the ultraviolet. Its long alkyl group at the ether linkage makes it compatible with polyolefins.

Polyethylene and polypropylene fibers light-stabilized with this absorber should find application as marine ropes and fabrics for lawn furniture, and automotive and household upholstery. Typical film and sheeting applications include "mulch" and greenhouse sheeting, irrigation tubes and silos.

(Cyasorb UV 314 light absorber is product of American Cyanamid Co., 30 Rockefeller Plaza, New York 20.)

Check 1080 opposite last page.



BRING YOUR PROBLEMS TO SINDAR!

Whether your line is soaps, paints, textiles, rubber, cosmetics, plastics, solvents...there's a Sindar product that can help you.

Our technical staff and laboratory facilities are at your service. We invite your inquiries.

SINDAR® Corporation
Industrial Aromatics and Chemicals

321 West 44th Street
New York 36, N. Y.

Check 1081 opposite last page.

CARDOX®

For CARBON DIOXIDE

BULK LIQUID

CARBONIC GAS

DRY ICE

NATIONWIDE DISTRIBUTION AND SUPPLY

Over 60 conveniently located CO_2 supply depots, supported by fleets of trucks and rail cars, insure reliable service and supply—regardless of your needs.

CARDOX DIVISION OF CHEMETRON CORPORATION
Dept. 633R, 840 N. Michigan Ave., Chicago 11, Ill. CHEMETRON

REGIONAL OFFICES:

Jersey City, N.J. 26 Journal Square
Detroit, Mich. 1723 W. Lafayette Blvd.
Fort Worth, Texas 825 N. Calhoun St.
Memphis, Tenn. 784 Mississippi St.
Chicago 9, Illinois 43rd & Marshfield
Los Angeles, Cal. 151 North Avenue 19

Check 1082 opposite last page.

Added commercial source for cyclohexylamine, dicyclohexylamine

Uses: Compounds have been used as ingredients for intermediates in corrosion inhibitors. They have been used as drying catalysts in ink and paint by complexing with metals such as cobalt or manganese. Patents have been issued describing the use of dicyclohexylamine, cyclohexylamine as ingredients in dyes, combustion catalysts and rubber antioxidants.

Features: Both materials are available in commerical quantities, for immediate delivery, in high purity. Company is one of the few domestic sources.

Description: Cyclohexylamine is a clear, colorless liquid with a characteristic amine odor. It is a strong base and has a reactive amino group undergoing the usual reactions of aliphatic primary amines. Purity by titration is 98% minimum. It is miscible with water and common organic solvents.

Dicyclohexylamine is a clear, colorless liquid with a faint amine odor. It is a strongly basic secondary amine with a reactive amine group. Purity is not less than 98%. Dicyclohexylamine is only slightly soluble in cold water and practically insoluble in hot water. It is miscible with common organic solvents and unlike cyclohexylamine it does not form an azeotrope with water.

Both compounds are very toxic. Avoid breathing the vapor or allowing it to come in contact with the skin.

(Cyclohexylamine and dicyclohexylamine are products of Chemical Marketing Division, Abbott Laboratories, 1400 Sheridan Road, North Chicago, Illinois.)

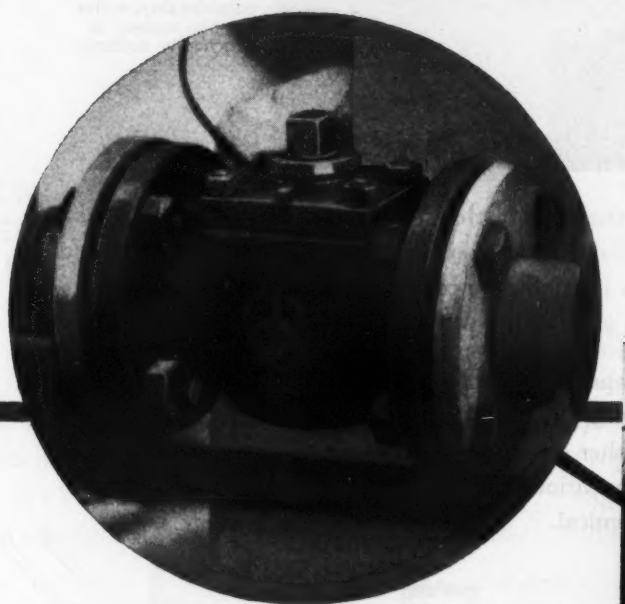
Check 1083 opposite last page.

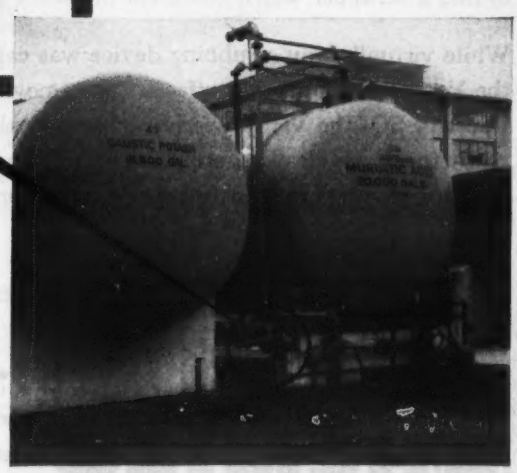
For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

PENTON® COATINGS

A simple solution to your complex

CORROSION PROBLEMS





PENTON MAKES TUFLINE VALVES TOUGHER

Tufline valves in sizes from ¼" to 2" with a CORVEL*-Penton coating are made by Continental Manufacturing Company, Cincinnati, O. The coating was applied by the WHIRLCLAD* customs coating service of The Polymer Corp., Reading, Penn.

**Trademarks of The Polymer Corp.*

Though many corrosion problems may seem complex, a Penton coating can often supply a simple answer. Economically applied to low-cost metal substrates, Penton provides a tough, pinhole-free barrier against corrosion at elevated temperatures.

A typical example is this Penton-coated TUFLINE plug valve, successfully serving in the discharge and filling line of a 20-Baume muriatic acid installation where even expensive metals could not withstand the corrosive exposures involved.

Durable Penton coatings for valves, pipes and fittings, and pump and meter parts ranging in thickness from 10 to 40 mils, can be achieved by various techniques. They provide excellent protection against the corrosive attack of acids, alkalis and solvents, both to exterior surfaces and interior wetted parts.

Penton, chlorinated polyether, is a modern engineering material with an established record of success in combating today's toughest corrosion problems. Easy to mold or fabricate, it can serve as a coating or liner for metal, or be used in solid molded form.

Want to learn more about Penton? Write for your copies of "The ABC's of Penton for Corrosion Resistance," which cites data on Penton's chemical resistance to more than 300 reagents, and "The Penton Buyer's Guide," a complete listing of fabricators and suppliers of Penton processing equipment.

CP60-13

HERCULES POWDER COMPANY
INCORPORATED
Hercules Tower, 910 Market Street, Wilmington 99, Delaware

Check 1084 opposite last page.

Before scrubber was installed — visible cloud is composed largely of water with about 0.5% sulfur trioxide

THE CHEMICO VENTURI SCRUBBER MAKES THE BIG DIFFERENCE

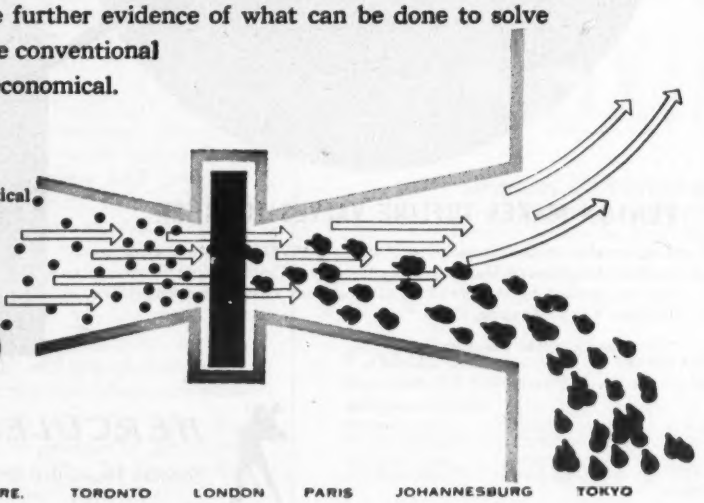
After scrubber was installed — water vapor has diminished considerably, sulfur trioxide content is practically nothing

With sulfur trioxide fumes being vented to the air in a thick vapor fog, Ansul Chemical faced an air pollution problem common to many chemical producers. They were willing and anxious to comply with community requests for pollution control, but they were unable to find a scrubber which could rid the stack of both the water vapor and the SO_3 as well.

While virtually any scrubbing device was capable of removing the water vapor, only the Venturi scrubber was effective in removing the acid fumes. By removing all but the last traces of SO_3 the Venturi scrubber gave further evidence of what can be done to solve really tough gas cleaning problems where conventional cleaning devices prove ineffective or uneconomical.

FULL DETAILS AVAILABLE

For your copy of a brochure giving complete data on Chemico Venturi gas scrubbers, or for technical assistance on a specific problem, write to Chemico at the address below.



CHEMICO

CHEMICAL CONSTRUCTION CORPORATION
Gas Scrubber Division
525 West 43rd Street, New York 36, New York

CHICAGO DALLAS HOUSTON PORTLAND, ORE. TORONTO LONDON PARIS JOHANNESBURG TOKYO

Check 1085 opposite last page.

Silicone for aerosols requires no catalyst or heating

Uses: Silicone water repellent is designed to provide improved durable water and weather resistance for leather, paper and paperboard products.

Features: An air-curing material, it acts without the catalysis or thermal cure and is ideally suited for packaging in aerosol spray cans.

Desription: Designated SS-4024, silicone water repellent is a solvent solution of silicone polymers and other film-forming components. In addition to aerosol packaging, it can be applied by spraying, brushing, swabbing, dip and roll coating. Applied coating resists oils, greases and alkali salts.

(SS-4024 silicone water repellent is product of Silicone Products Dept., General Electric Co., Waterford, N. Y.)

Check 1086 opposite last page.

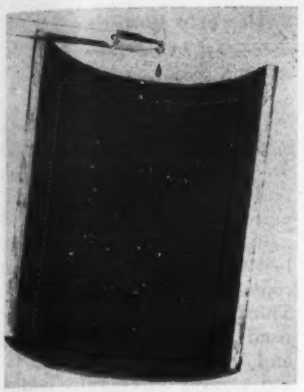
Corrosion problems cut by filming amines

Uses: Filming amine is formulated to permit easy application directly to boilers, steam turbines or other areas where a steam and condensate system is used. It is particularly aimed at the paper mill industry where handling and feeding have been a problem.

Features: Super Filmeen is said to contain 31% more filming action than conventional octadecylamine acetate. It may be mixed with any type of dilution water and fed to any point in the system. Separate feed equipment is not necessary. Acid-resistant mixing tanks and feed pumps are not required.

Description: Product is an octadecylamine containing no acetate salts. Cleaning action removes layer of scale and corrosion products and inhibits formation of further deposits.

In the paper mill industry, in addition to ease of handling, wax-like coating formed by the amine reduces the amount of condensate being carried



Filming amine forms monomolecular layer on metal surface causing steam to condense in drops, thus improving heat transfer rate

around dryer roll surfaces, thus increasing the speed that can be obtained before rimming occurs. Monomolecular protective film causes steam to condense in droplets, increasing heat transfer rate.

(Super Filmeen is the product of Dearborn Chemical Company, Merchandise Mart Plaza, Chicago 54, Ill.)

Check 1087 opposite last page.

Soluble cholesterol is convenient, economical

Uses: Product can be used in all types of topical preparations, including clear aqueous and alcoholic vehicles and emulsions.

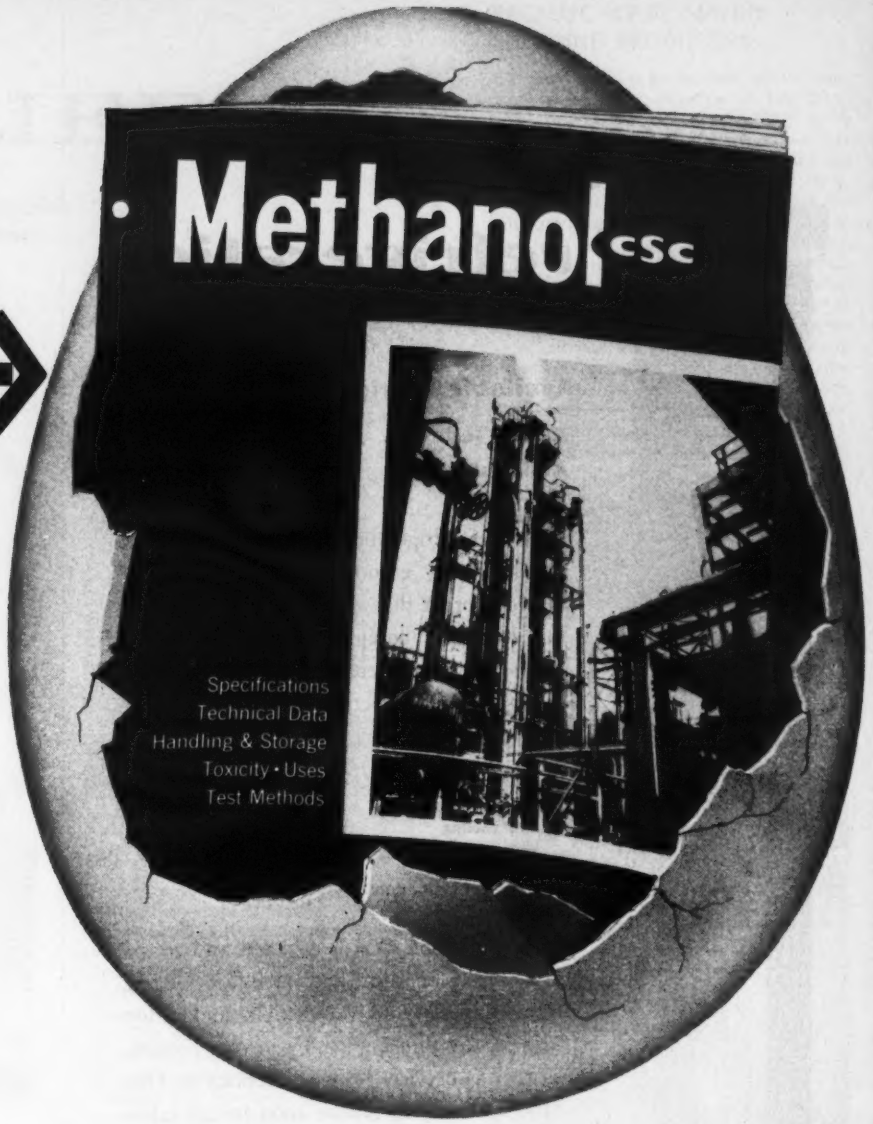
Features: Stable, 100% active, water and alcohol soluble form of cholesterol is designed to provide a convenient and economical source of this beneficial skin moisturizer.

Description: Solulan C-24 is the 24 mol ethylene oxide ether of cholesterol. It contains approximately 25% pure cholesterol. Formulation has balanced hydrophilic and hydrophobic properties designed for optimum solubility without loss of the emollient and protective properties of cholesterol.

(Solulan C-24 is product of American Cholesterol Products Inc., Amerchol Park, Edison, N.J.)

Check 1088 opposite last page.

Just out!



NEW METHANOL GUIDEBOOK

Just off the press – the new CSC Methanol Guidebook. It's packed with solid "meat" . . . and it's yours without obligation. 32 pages . . . 36 useful tables, graphs and charts . . . information sections include specifications, chemical properties, physical properties, uses, toxicology, shipping, handling, storage and specification test methods. *Mail coupon for your free copy.*

INDUSTRIAL CHEMICALS DEPARTMENT

COMMERCIAL SOLVENTS CORPORATION

260 MADISON AVENUE, NEW YORK 16, N. Y.

Please send me the new CSC METHANOL GUIDEBOOK.

NAME_____ TITLE_____

COMPANY_____ STREET_____

CITY_____ ZONE_____ STATE_____

Check 1089 opposite last page.

CO_2 for refrigeration

Available Refrigeration Potential

As Dry Ice	**Approx. 275 BTU/lb.**
As Liquid @ 0°F.	**Approx. 130 BTU/lb.**

Wherever refrigeration is needed, CO_2 does the job rapidly, economically and well. Here's the refrigerant that cools everything...without expensive equipment and with quick, clean efficiency. Here are just a few of the places where fast-acting CO_2 can save you money.

Chill grinding	Freezing tissue
Freeze drying	Investment casting
Drill cooling	Alloy treatment
Aluminum anodizing	Dewaxing oils
Alloy treatment	Rubber tumbling
Mixing	Hardening

Olin Mathieson CO_2 is handled and stored in a variety of forms and quantities ranging from "Low-Pressure" units to 24- and 30-ton tank cars for direct unloading to your process, as well as dry ice. Why not contact an Olin Mathieson representative soon for an informative discussion that may open new and more economical uses for this safe, tested refrigerant.

7334

Olin Mathieson
CHEMICALS DIVISION, BALTIMORE 3, MD.

CHEMICALS

Check 1090 opposite last page.

Emulsions easily formed with wax that melts at 120°F

Uses: Wax is recommended for metal working and drawing; also for chemical specialty, cosmetic and textile operations; and a wide range of industrial uses, from rust inhibitors to oil well drilling.

Features: Self-emulsifiable wax forms stable emulsions easily, simply by adding warm water to the melted wax and agitating. It will form permanent emulsions containing as much as 90 to 95% water, in neutral, acid or alkaline solutions. It forms a white, creamy lotion with no odor or separation even after weeks of standing.

Description: Product, emulsifiable Hywax-122, is composed essentially of myristyl, cetyl and stearyl alcohol esters with a chemically bound emulsifier. Wax has a melting point of 120°F and is free of odor, light in color and heat stable. It will not oxidize nor turn rancid. Wax is supplied in plastic-lined fiber containers, tank cars or wagons.

(Emulsifiable Hywax-122 is the product of Werner G. Smith, Inc., 1730 Train Ave., Cleveland 13, Ohio.)

Check 1091 opposite last page.

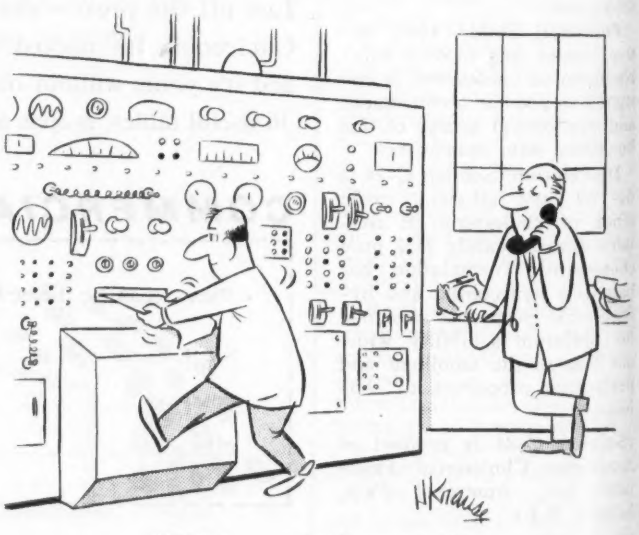
Basic resin qualities retained in netting of polyethylene

Uses: Among uses already established for this material are as the center tube in cylindrical filter cores, replacing more expensive perforated metal cylinders; in pressure-leaf and vacuum-leaf filters to replace woven stainless steel. Thinner gage material can be used as mesh bags for fruit and vegetables or as decorative sleeves on pressure bottles and aerosol cans.

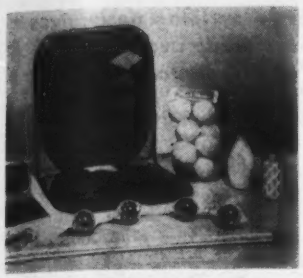
Features: Production technique forms polymers directly in tubular net form through a single operation. Each strand intersection becomes an integral part of the material, even stronger than individual strands. Products retain the chemical and physical characteristics of the basic resin.

Description: Initial production is from polyethylene although other resins can be used. Strand diameters can be made from 15 mils up. Mesh size can be varied from 16 counts to the inch to more than an inch between strands.

Three basic patterns are available: diamond, where intersecting strands are on the bias to the direction of extrusion; twill, in which one strand parallels the extrusion



"Hello! . . . . . brain surgeon?"



Here are portion of the end use possibilities predicted for Vexar plastic netting

direction while the other is on the bias; and plaid, a decorative version of the diamond pattern in which strands are grouped and spaced unevenly to provide a wide variety of effects.

Product is now available at a price of $1.50/lb in tubular or sheeting form.

(Vexar plastic netting is product of Film Department, E. I. du Pont de Nemours & Company, Wilmington 98, Del.)

Check 1092 opposite last page.

Cationic textile softener readily formulated as a 25% active dispersion

Uses: Product softens and lubricates fabrics and thread to improve sewing and napping qualities and give finished goods a full rich hand.

Features: This 100% active, light-colored softener can be readily formulated by textile compounder as a 25% active dispersion that can be handled easily by the mill using the conventional methods. It can be applied to cotton, rayon, synthetics and wool. Product is readily and easily diluted, even in cold water, to desired bath concentration.

Description: Product, G-3573, is a cationic, polymeric, fatty amine blend. Light tan paste is compatible with resins, catalysts, nonionic wetting agents, hand builders and starches normally encountered in finishing.

(Atlas G-3573 is the product of Atlas Powder Company, Dept. C, Wilmington 99, Delaware.)

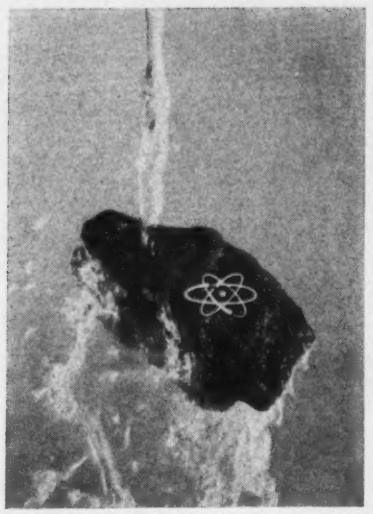
Check 1093 opposite last page.

BRIEFS

oxalic acid
phosphoric anhydride
chlorine chemistry

WE GET FAN MAIL

Manufacturers are more likely to get complaints than compliments and, in most companies, are set up to handle them as delicately and expeditiously as possible. But no one seems to have a setup for the routine handling of complimentary letters. So, when customers write in to compliment us on the uniformity of particle size and quality of our oxalic acid, all we can do is be pleased about it. This at least affords an opportunity to stress the point that we take a lot of pains to keep sulfates low (to a typical 150 to 300 ppm). We make oxalic acid in two crystal sizes, numbers 2 and 3 fine, and as non-dusting as possible. It assays at 99.8% min. Ask for Data Sheet No. 789, covering properties and uses of oxalic acid.

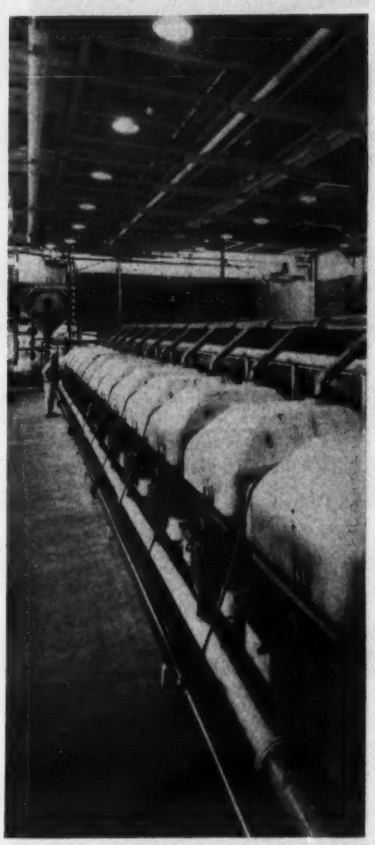


P_2O_5 INVADES THE WORLD OF THE ATOM

There's a relatively new process being used to recover uranium oxide from crude ores. It substitutes solvent extraction for the older phosphate precipitation method and not only gets more uranium from the ore but does it more cheaply, permitting more automation, too. The solvent employed is dodecyl phosphoric acid made from Hooker phosphoric anhydride (pentoxide). Advantages for the new process include low first cost for solvent, re-use of solvent, low solubility of solvent in aqueous phase, high concentration ratio, low over-all chemical costs. Hooker P_2O_5 assays typically 98% minimum. Contaminants such as Fe, Pb and Cl are maintained at a 2 ppm max. Fluorine is no greater than 3 ppm. Arsenic is no higher than 50 ppm, and sulfate is completely absent. Write for Data Sheet No. 802.

BECAUSE WE'RE MAJOR CHLORINE PRODUCERS

We've learned a great deal about handling and using chlorine in the fifty-seven years we've been making it. A great deal of chlorine is used in our captive processes for such things as chlorobenzenes, chlorotoluene compounds and similar products. But we sell much more than we use ourselves, which is one reason why we publish safety charts and technical manuals and go to great lengths to help customers use chlorine safely as well as effectively. When you get right down to it, almost anything worth knowing about the handling and uses of chlorine can be learned from Hooker. We can ship from several points in cylinders, ton containers, or railway tank cars. Try us and see how well we can serve you.



For more information, check here and mail with name, title and company address:

- ☐ Oxalic acid data sheet
- ☐ Phosphoric anhydride data sheet
- ☐ Chlorine manual

HOOKER CHEMICAL CORPORATION
511 Forty-seventh Street, Niagara Falls, New York

Sales Offices: Buffalo Chicago Detroit Los Angeles New York Niagara Falls Philadelphia Tacoma Worcester, Mass.
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

HOOKER CHEMICALS PLASTICS

Check 1094 opposite last page.

Two pyridine derivatives are made available experimentally

Two materials, 3-picolylamine and 3-pyridyl carbinol, have recently been introduced on an experimental scale.

3-picolylamine is a dibasic amine. It has chemical properties associated with aliphatic primary amines and is capable of entering into the same type of reactions as other aliphatic primary amines, within the limitations imposed by the pyridine nucleus. Molecular weight is 108.1. Boiling point is 226°C at 760mm. Purity is 98% minimum.

3-pyridylcarbinol is a heterocyclic amine as well as a primary alcohol. It has the chemical properties of the pyridine, altered somewhat by the primary alcohol group in the molecule. It is also capable of entering into reactions typical of primary alcohols, except as restricted by the influence of the pyridine nucleus. Molecular weight is 109.1 with a boiling point of 266°C at 760 mm. Purity specification is 95% minimum.

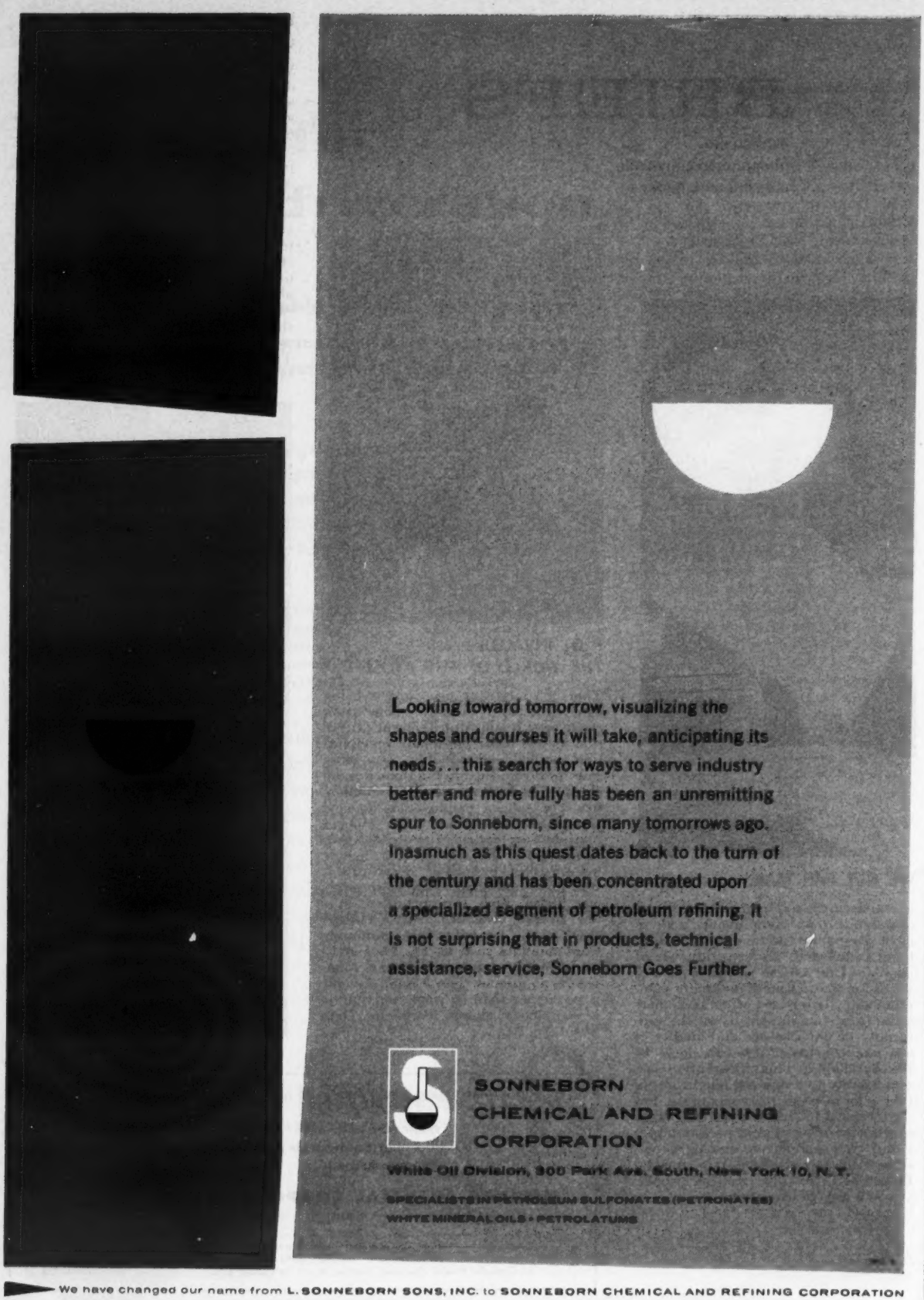
Both products are soluble in water at 20°C in all proportions. Drum price on 3-picolylamine is $3.75/lb; 3-pyridylcarbinol is priced at $9.00 /lb in quantities of one drum or more. Small lot prices are proportionally higher.

(Picolylamine and pyridylcarbinol are products of Reilly Tar & Chemical Corporation, 1615 Merchants Bank Building, 11 S. Meridian St., Indianapolis 4, Ind.)

Check 1096 opposite last page.

Easily workable form of aluminum plus boron carbide

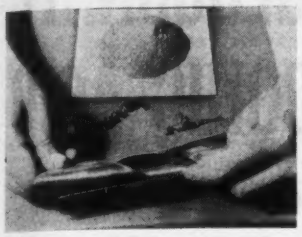
Aluminum plus boron or rare earth oxides, a highly useful control material for nuclear reactions, is now available in a pure, homogeneous and easily workable form. For example, boron carbide uniformly dispersed in an aluminum matrix, can be produced in continuous strip form which


Looking toward tomorrow, visualizing the shapes and courses it will take, anticipating its needs... this search for ways to serve industry better and more fully has been an unremitting spur to Sonneborn, since many tomorrows ago. Inasmuch as this quest dates back to the turn of the century and has been concentrated upon a specialized segment of petroleum refining, it is not surprising that in products, technical assistance, service, Sonneborn Goes Further.
SONNEBORN
CHEMICAL AND REFINING
CORPORATION
White Oil Division, 300 Park Ave. South, New York 10, N. Y.
SPECIALISTS IN PETROLEUM SULFONATES (PETRONATES)
WHITE MINERAL OILS • PETROLATUMS
We have changed our name from L. SONNEBORN SONS, INC. to SONNEBORN CHEMICAL AND REFINING CORPORATION

Check 1095 opposite last page.

may be wound into coils and cylinders.

Physical properties equal or exceed those of a cast or wrought alloy of the same



Almost as ductile as pure aluminum, sintered boron-aluminum composite does not fracture even when subject to severe twisting

composition. Other rare-earth oxides can be combined with aluminum or with stainless steel.

Binal (boron carbide in an aluminum matrix) is furnished as foil, up to ¼" thick by 5' wide. Composites can be ordered in many different shapes including tubes, strips, or readily fabricated plates.

(Binal alloy is product of Sintercast Division, Chromalloy Corporation, 132 Woodworth Avenue, Yonkers 2, New York.)

Check 1097 opposite last page.

Glass fiber chopped strand increases production, ups product quality

Product "Wets Out" faster, has greater uniformity

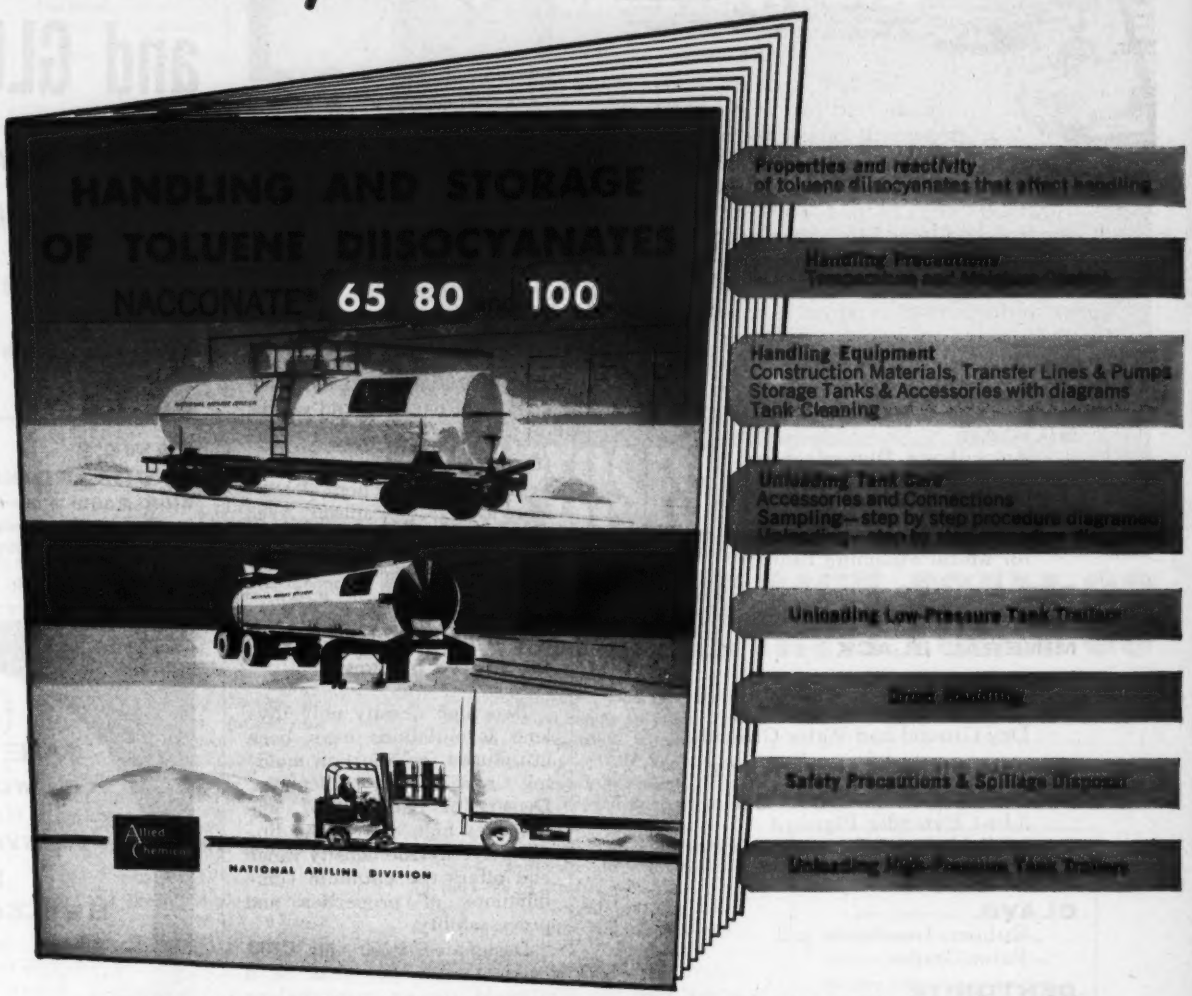
Uses: More than 90% of reinforcing material used in reinforced plastics is glass fiber. This improved chopped strand mat is designed for this reinforced resin market.

Features: Product is claimed to wet out three to five times faster than material now available. It has improved uniform fiber distribution and weight. Pure-whiteness will impart no off-color to finished laminates.

Description: Glass fiber chopped strand mat, called Garanmat, is made of continuous filament glass fiber roving to which a highly soluble binder has been applied. Roving is chopped into length

NOW AVAILABLE

first complete manual on



Handling highly-reactive toluene diisocyanates so as to avoid contamination between manufacture and use requires simple yet explicit techniques, equipment and precautions.

These are covered by detailed text and diagrams in our new manual, prepared especially to assist present and potential users of Nacconate® 65, 80 and 100 (toluene diisocyanates) in tank car, tank truck or drum lot quantities. To obtain your copy for present use or future reference, use the convenient coupon below.

Allied Chemical

NATIONAL ANILINE DIVISION
40 RECTOR STREET, NEW YORK 6, N. Y.
Atlanta Boston Charlotte Chicago Dallas Greensboro
Los Angeles Philadelphia Portland, Ore. Providence San Francisco
In Canada: ALLIED CHEMICAL CANADA, LTD.,
1450 City Councillors St., Montreal 2 100 North Queen St., Toronto 18
Distributors throughout the world. For information
ALLIED CHEMICAL INTERNATIONAL • 40 Rector St., New York 6, N. Y.

Kindly send NACCONATE Diisocyanates Handling Manual. Our interest is:

☐ We now use diisocyanates
☐ May use ☐ Future reference only

NAME _____
COMPANY _____
ADDRESS _____

Check 1098 opposite last page.

For half a century we have had the privilege of providing basic ingredients to industry. While we welcome new customers, the great bulk of our business comes from accounts who have been on our books as long as two generations. Tight quality control is a tradition with Tamms, and this policy insures uniformity of product, a safeguard for the quality of your products or processes. We will be delighted to send samples, specifications, and prices.

SILICAS
Amorphous, Diatomaceous and Crystalline

TAMART
Produced and graded special for Metal Finishing Industry

RED OXIDES
Natural and Synthetic grades

MINERAL BLACK

YELLOW OCHRE

CALCIUM CARBONATES
Dry Ground and Water Ground

MAGNESIUM CARBONATE

MAGNESIUM SILICATES
3-in-1 Extender Pigment available in 5 different mesh sizes

SOAPSTONE

CLAYS
Rubber, Insecticide and Paint Grades

BENTONITE

DRY-IT
An Oil-Grease and Water Floor Absorbent, Natural and Calcined Grades

SILICA SANDS

VOLCANIC ASH

PUMICE STONE

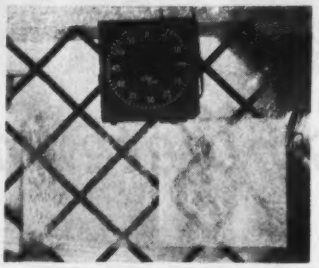
WHITE ROUGE

Tamms INDUSTRIES CO.

228 North LaSalle Street · Chicago 1, Illinois

WHERE YOUR BUSINESS IS APPRECIATED!

Check 1099 opposite last page.



Greater clarity of Garanmat (left) indicates that it is "wetting out" more quickly than conventional mat

of approximately two inches and formed into a mat with random pattern. It has an easy-draping quality, conforms readily to mold shapes, lays well into tight corners.

Garanmat is presently available in weights of 1-¼, 1-½, 2 and 3 oz per sq ft and widths up to 76".

(Garanmat is the product of Textile Glass Section, Johns-Manville, 1810 Madison Ave., Toledo 1, Ohio.)

Check 1100 opposite last page.

Linear polyethylene duo introduced by Dow

Two high density polyethylene formulations have been introduced for injection molding and film applications. Density of resins, 0.957, approaches high end of the linear polyethylene density range and offers the optimum combinations of properties and processability.

Designated R600 and R800, products are the first of a planned linear polyethylene series. Field evaluations and laboratory data indicate resins will shrink 10 to 30% less than other linear resins in many applications. This provides better control over warpage. Film overwraps show good gloss and clarity as well as excellent fabrication characteristics, according to the manufacturer. Price will be 35¢/lb in truckload quantities.

(High-density Polyethylene R600 and R800 are products of Dow Chemical Company, Midland, Michigan.)

Check 1101 opposite last page.

DAWE'S

a dependable source for

SODIUM GLUCONATE and GLUCONIC ACID

Promptly available in any quantity.

Warehouse stocks across the country.

Dawe's high quality is assured.

Write for technical data and samples.

DAWE'S LABORATORIES, INC.
4800 South Richmond Street
Chicago 32, Illinois
Italy — Via G. Negri 4, Milan
Mexico — Apartado Postal 30209, Mexico 7, D. F.

Dawe's

Check 1102 opposite last page.

Available
WET OR DRY
The ***WORKHORSE CATALYST*** *for* ***POLYMERIZING SYNTHETIC RESINS***

LUCIDOL BENZOYL PEROXIDE

In dry form, Lucidol Benzoyl Peroxide has long been the quality standard of the industry. It is available, for those who prefer it, in wet form (20-25% water). The peroxide net weight per package is the same. The applications are identical — polymerization of vinyl acetate, vinyl chloride, vinylidene chloride, methylmethacrylate, styrene and unsaturated polyesters — and for copolymerizations of the same monomers.

Write for Data Sheet or Consult Chemical Materials Catalog Page 199 for further data.

LUCIDOL DIVISION

WALLACE & TIERNAN INCORPORATED
1740 MILITARY ROAD
BUFFALO 5, NEW YORK

Check 1103 opposite last page.

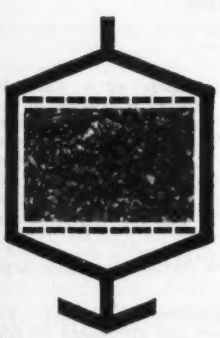
how to bar the tar

A vapor trap no bigger than a cigarette filter—now, oddly enough, goes on a cigarette that's making big news. Vapor phase contaminants such as tars are hauled up short by activated charcoal built into the filter. Maybe you are a pipe smoker—or a non-smoker—and worry about contaminants in other forms. Try activated charcoal. It'll knock the tar out of your problems.

how to make dew

Do you make do with water laden with chlorine and organic decay or discoloration when fresh morning dew will do better? Make dew do for you too with water purified by activated charcoal. Chemical, pharmaceutical and food producers have been doing it for years. It's a sure bet for product improvement.

activated carbon



We supply a complete line of activated carbons for every purpose; design and prefabricate complete purification, separation, and recovery systems to meet your particular needs. Write for Bulletin J-103 and recommendations on your specific application. Barnebey-Cheney, Columbus 19, Ohio.

Barnebey Cheney

Check 1104 opposite last page.

NEW LITERATURE

Chemical Materials

Chemical products are highlighted in 36-page, two-color brochure which catalogs all of manufacturer's chemicals alphabetically, with physical data and uses. "FMC Chemicals" — Chemical Divisions, Food Machinery and Chemical Corporation.

Check 1105 opposite last page.

A water dispersible lecithin is subject of brochure duo that explains uses and gives chemical constants. "Kelecin 1081" — Spencer Kellogg and Sons, Inc.

Check 1106 opposite last page.

An emulsifier for cosmetics and pharmaceutical applications is described in 20-page bulletin. Product, Ceramol, is a blend of cetyl and stearyl alcohols. Clinical details and bibliography are included. "Ceramol"—Aceto Chemical Company, Inc.

Check 1107 opposite last page.

Rubber vulcanizing agents, heat-reactive dimethylol phenol resins, are described in eight-page brochure. Technical topics include a section on curing as well as considerable performance data. From Catalin Corporation of America.

Check 1108 opposite last page.

Synthetic methanol is comprehensively treated in 32-page brochure. Included are specifications, physical and chemical properties, and toxicology and health hazards. "Methanol"—Commercial Solvents Corporation, Industrial Chemicals Department.

Check 1109 opposite last page.

Over 300 biochemicals are listed in combination price list and catalog now available. Radiochemicals are also included. "Biochemicals and Radiochemicals" — Schwarz BioResearch, Inc.

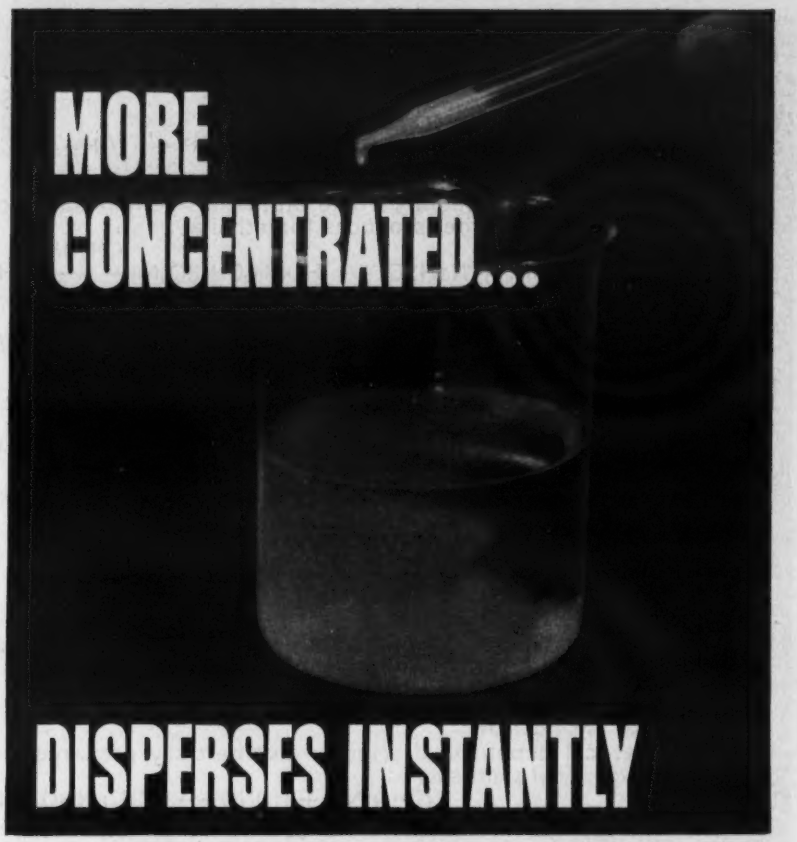
Check 1110 opposite last page.

"Designing Vinyl Stabilizers to Solve Special Problems" is a technical paper reprint that discusses various problems involved in developing stabilizers to meet the requirements of vinyl end-product properties — Ferro Chemical Div., Ferro Corporation.

Check 1111 opposite last page.

Urethane finishes are described in four-page technical bulletin which covers two resin systems offered as clear coatings. Techniques for using the finishes are also included. Technical Bul 3-60 — B. B. Chemical Company.

Check 1112 opposite last page.



G-E SILICONE ANTI-FOAM 60

More concentrated: General Electric Anti-Foam 60 comes to you in concentrated form (30% silicones) for easier handling and storage. You can use it as supplied, or reduce it with water to any desired concentration.

Disperses instantly: G-E Anti-Foam 60 can be poured and disperses instantly because of its low viscosity. This makes it easier to use and faster-acting than other silicone defoamers.

More economical: Only a few parts per million are needed in most foaming systems, even less than other silicone anti-foams. And because such minute quantities are used, G-E Anti-Foam 60 does not affect the other properties of your formulation, as organic defoamers are apt to do. Write for a free sample.

How G-E Anti-Foam 60 saves you money . . .

1 ppm defoams vat dyes
5 ppm defoam paper sizes
25 ppm defoam resin finishes
100 ppm defoam latex coatings

GENERAL ELECTRIC

MAIL THIS COUPON FOR FREE TEST SAMPLE:

General Electric Company, Silicone Products Dept., Section PP114, Waterford, New York
Please send me a free sample of G-E Anti-Foam

☐ for aqueous systems ☐ for non-aqueous systems

Application: _____

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____

Check 1113 opposite last page.

▶ **RUBBER ACCELERATOR AND FUNGICIDE**

Sodium dimethyldithiocarbamate is made by the reaction of dimethylamine, carbon disulfide and caustic.

$$(CH_3)_2NH + CS_2 + NaOH \longrightarrow (CH_3)_2N{-}\overset{\overset{S}{\|}}{C}{-}SNa$$

▶ **SURFACE-ACTIVE AGENTS**

a. The reaction of monomethylamine with hydroxyethanesulfonic acid (obtained from ethylene oxide and sodium bisulfite) produces N-methyltaurine:

$$\underset{\diagdown\,O\,\diagup}{CH_2{-}CH_2} + NaHSO_3 \longrightarrow HOCH_2CH_2SO_3Na \xrightarrow{CH_3NH_2} CH_3NHCH_2CH_2SO_3Na$$

Reacting N-methyltaurine with acid chlorides of fatty acids, RCOCl, produces surface-active agents of the type $RCO{-}\underset{\displaystyle CH_3}{\underset{|}{N}}{-}CH_2CH_2SO_3Na$.

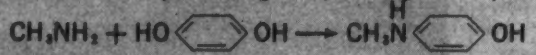
b. Analogous fatty acid amides are produced by first making sodium sarcosinate from monomethylamine and glycolonitrile:

$$CH_3NH_2 + HOCH_2CN \longrightarrow CH_3NHCH_2CN \xrightarrow{NaOH} CH_3NHCH_2COONa$$

Sodium sarcosinate is then reacted with a fatty acid chloride to give the surface-active N-acyl-sarcosinate, $RCO{-}\underset{\displaystyle CH_3}{\underset{|}{N}}{-}CH_2COONa$.

▶ **PHOTOGRAPHIC DEVELOPER**

Reacting hydroquinone with monomethylamine gives p-methylaminophenol:



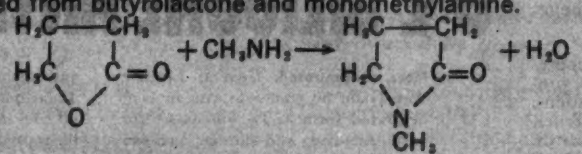
▶ **ROCKET PROPELLANT**

Unsymmetrical dimethylhydrazine is commercially prepared from dimethylamine by several routes. A classical synthesis is:

$$(CH_3)_2NH + HONO \longrightarrow (CH_3)_2NNO + H_2O$$
$$[H] + (CH_3)_2NNO \longrightarrow (CH_3)_2NNH_2 + H_2O$$

▶ **SOLVENT**

N-Methyl-2-pyrrolidone, a solvent for spinning various synthetic fibers and for solubilizing resins and waxes, is prepared from butyrolactone and monomethylamine.



METHYLAMINES... typical end products and reaction routes

The products and reaction routes above give only a few of the application possibilities where methylamines are valuable intermediates for introducing amino nitrogen. If you would like to explore the usefulness of these amines, Rohm & Haas can supply you with: (1) anhydrous mono-, di-, or trimethylamine in 5, 25, 50, or 100-pound cylinders for laboratory work; aqueous and anhydrous amines in tankcars, tankwagons, drums for your production needs, (2) up-to-date technical literature, (3) technical advice on the design of storage and handling facilities, and (4) sample quantities of aqueous amines, and anhydrous amines in 5-pound cylinders (with a small deposit for the cylinders).

Write to Dept. SP-10 for these three methylamine booklets:
Chemistry and Uses
Storage and Handling
Physical Properties and Analytical Methods

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

METHYLAMINES

Check 1114 opposite last page.

Silicone rubbers that vulcanize at room temperature are discussed in technical data book of 12 pages. In addition to up-to-date information on product properties, data booklet also includes additional information on thermal conductivity, compression set, heat ageing and electrical properties. Bul S-3 — Silicone Products Department, General Electric Company.

Check 1115 opposite last page.

Transparent water repellent, Hydrocide S-X Hycon, is subject of a brochure containing photographs to show the evidence of superior water repellent qualities. A chart compares the product with conventional silicones. Hydrocide S-X brochure—Sonneborn Chemical and Refining Corporation.

Check 1116 opposite last page.

Adhesives properties chart containing latest information on epoxy adhesives, their application, cure times and physical properties. The reverse side of chart contains test methods, application suggestions and availability. New Adhesives Properties Chart—Furane Plastics, Inc.

Check 1117 opposite last page.

Citric acid brochure outlines results of a comprehensive research study on this product. Brochure is well illustrated with photographs, charts and graphs, and includes physical and chemical properties, grades available and applications. "Citric Acid" — Miles Chemical Company.

Check 1118 opposite last page.

Ion exchange as a water treatment process is covered in seven-page reprint. Amply illustrated with graphs and photographs, paper presents recent developments that lead to a better understanding of the use of ion exchange. Reprint No. 84—Nalco Chemical Company.

Check 1119 opposite last page.

Applications of 13 major plastic families are compared in pocket-sized six-page booklet. Five major misconceptions about plastics are corrected. "Facts About Plastics" — Cadillac Plastic & Chemical Company.

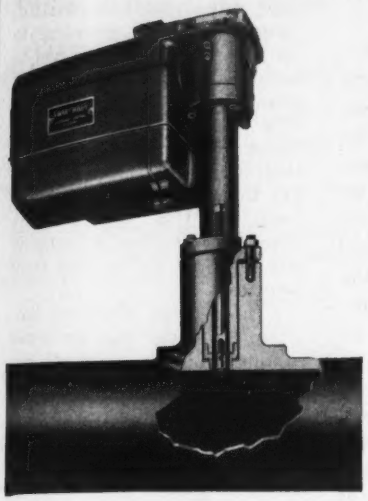
Check 1120 opposite last page.

Complete tabulated information on products derived from aluminum silicate, attapulgus clay, activated bauxite and limestone are offered in eight-page catalog. Data includes properties, typical chemical analysis, and applications in various industries. Technical Information Bul 1004 — Minerals and Chemicals Philipp Corp.

Check 1121 opposite last page.

Great things are happening in AutroniC® Control

TOUGH PROBLEMS ARE NO PROBLEM



FOR THIS FOOLPROOF, FOUL-PROOF PRESSURE TRANSMITTER

Here is a primary sensing element for those tough jobs you'd like to forget. Mounted right on the process pipeline or tank, the Swartwout Flush Diaphragm Pressure Transmitter will effortlessly measure pressure or liquid level of polymers, slurries, asphalts, viscous fluids, molten metals and other difficult media. No stagnant pressure lines, no steam jacketing necessary . . . the stainless steel transmitter diaphragm fits flush with the inside of the vessel.

A friction-free linkage multiplies diaphragm motion and actuates the core of a differential transformer to produce a 0-0.5V AC signal for any Swartwout AutroniC indicator, recorder or controller. Sensitivity is better than 0.005%, reproducibility 0.1%, accuracy 1.0%.

The Flush Diaphragm Pressure Transmitter is just one unit in the constantly-growing AutroniC family of electronic instrumentation . . . a family that includes all necessary components for complete electronic control of any process parameter.

For details on the Flush Diaphragm Pressure Transmitter, request Bulletins A-713 and A-718. Swartwout Division, Crane Co., Hooksett Industrial Park, Manchester, N.H.

SWARTWOUT

. . . world leader in electronic process instrumentation

S.A. 1958

Check 1154 opposite last page.

Import Challenge

From page 42

good for significant return.

Recently, before certain Government committees holding hearings of businessmen's views as a prelude to the GATT negotiations, some importers asked for lowered tariffs on certain products not generally available. "Our answer to this," counters a small producer, "is that we are a segment of the industry that makes a living by producing and freely selling just those products which are 'generally unavailable.' Set an open door policy for such materials and we won't be able to continue . . ."

Can Technology Compensate For Lower Labor Costs?

Can our technology be advanced to the point that it will permit us to compensate for lower foreign labor costs? Industry consensus is that the Germans — whose synthetic organic chemical (intermediates and dyestuffs) plants were rebuilt after World War II — have more modern facilities than those of most U.S. producers. Control over operations is more modern, cleaning-up after making batches of highly-colored dyes is more efficient.

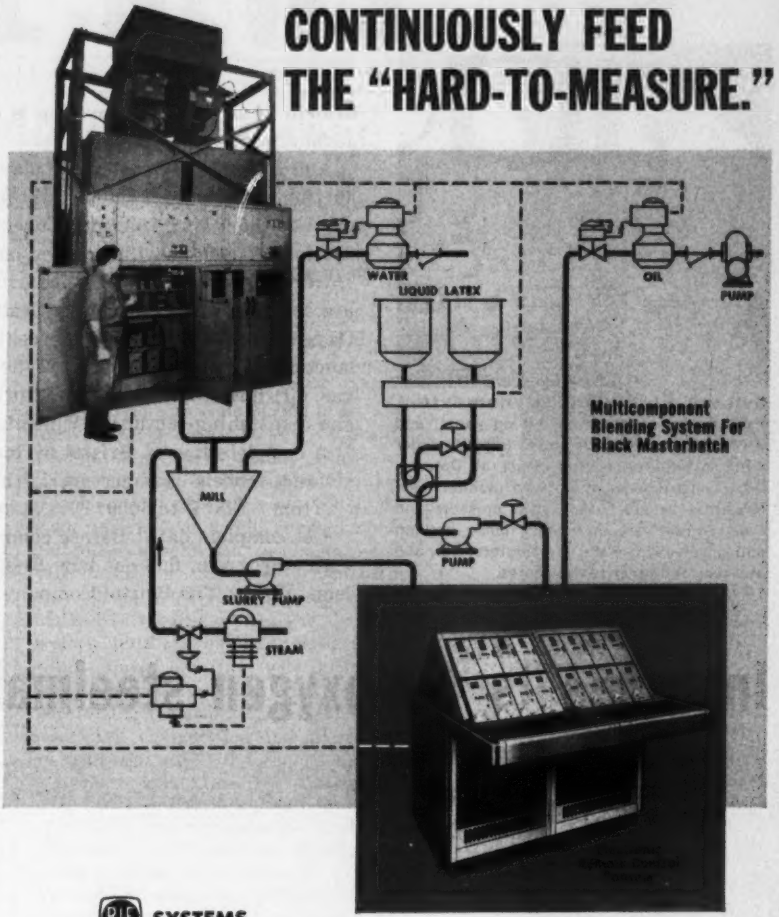
The major impediment in our overtaking and surpassing the Germans costwise is, however, the small output of the processes involved . . . too little, according to present-day concepts of process engineering, to justify continuous processing facilities. It is here that the attitude of the industry may change — interest might lead to the development of mini-continuous plants smaller than today feasible.

"Why, however, should we invest all the money that would be required for the process research to learn to scale-down," complains one operator, "as long as we'd still have no assurance we could undersell the Germans. Remember, low labor costs apply to their plants as well as operations. We might well be substituting a far more expensive plant for some of the higher labor costs . . ."

If this is the general attitude towards process research, it by

POSITIVE CONTROL OF MATERIALS IN MOTION BIF METERS FEEDERS CONTROLS

CONTINUOUSLY FEED THE "HARD-TO-MEASURE."



BIF SYSTEMS

PROVIDE NEW DIMENSION IN CONTINUOUS PROCESSING

For difficult processing problems involving hard-to-handle, hazardous or toxic materials, B-I-F offers "systems know-how" combined with 25 years field experience in feeding techniques.

B-I-F performance-proved, loss-in-weight feeding systems are currently being used for such difficult materials as: Carbon Black, Latex, Ammonium Perchlorate, Tetraethyl Lead, Catalysts, Food Additives and High Vapor Pressure Liquids.

Here's why:

- Materials are completely enclosed in feeding unit which can be pressurized with inert gas.
- Feeds any flowable solid or liquid material from 1 to 60,000 pounds per hour. Built-in rangeability to meet specification from 10 to 1 to 50 to 1 depending on material.
- Accuracy — ¼ of 1% by weight of set feed rate. Automatic feedback control loop prevents cumulative error.
- Proportional pacing by mechanical, electrical, pneumatic or electronic controls.
- Rate of feed may be controlled locally or remotely.
- No field calibration required.

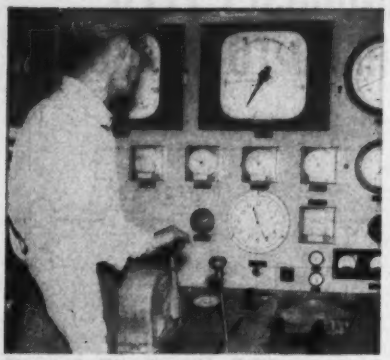
B-I-F Industries

BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA

METERS • FEEDERS • CONTROLS / CONTINUOUS PROCESS ENGINEERING

Continuous feeding can be your answer to greater processing efficiency. Request Bulletin 32-R2. Write **B-I-F Industries, Inc., 387 Harris Avenue, Providence 1, Rhode Island.**

Check 1122 opposite last page.



Bristol Electronic Dynamaster* Potentiometers (top left on panel) and Bristol Metagraphic Miniatures (directly under Dynamasters) on control panel at Dofasco. Bristol instruments at Dofasco monitor such important variables as oxygen pressure and flow (current rate and total), lance position and lance cooling water temperature, flow and pressure and other temperatures.

**T.M. Reg. U.S. Pat. Off.*

Growth of oxygen steelmaking is one of the most exciting steel-industry advances during the past decade.

And Bristol instruments are playing an ever increasing part in this production revolution—from the first basic oxygen (L-D process) steelmaking plant on the North American Continent (see photos) to oxygen-using modifications of open-hearth furnaces, bessemer converters, and electric furnaces.

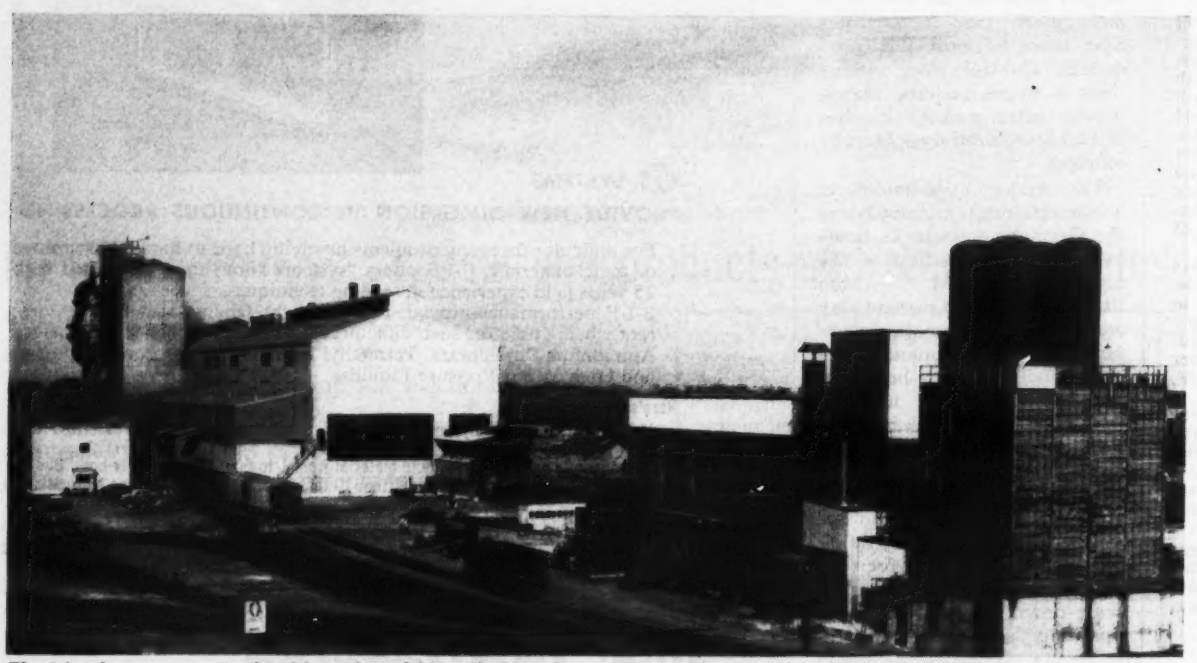
Here are just a few of the important variables Bristol instruments measure, indicate, record, or automatically control in modern oxygen steel plants: Oxygen pressure and flow (current rate and total), oxygen lance position, lance cooling water temperature, flow and pressure, fuel (coke-oven, natural gas, oil) flow, totalized flow and pressure—as well as complete telemetering and dispatching-center instrumentation for both fuel and oxygen pipelines.

A complete line of Bristol pyrometers—radiation, thermocouple and resistance models—and accessories are offered for every temperature range ... from −125° F to 5000° F... in every kind of steel plant.

Get complete data! Before committing your steel plant to *any* modernization program, find out how *Bristol* can solve your instrumentation problems. Write: The Bristol Company, 141 Bristol Road, Waterbury 20, Conn.

0.30

Instruments for oxygen steelmaking... by Bristol



First basic oxygen steelmaking plant in North America at Dominion Foundries and Steel, Ltd., (Dofasco) at Hamilton, Ontario, Canada. Oxygen plant in foreground; steelmaking plant in distance. Bristol instruments play an important part in this pioneering operation.

BRISTOL ... for improved production through measurement and control

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Check 1123 opposite last page.

Import Challenge

From preceding page

no means is the same towards *product* research. Speaks another small intermediates manufacturer, Carwin Company (North Haven, Conn.) v-p sales Richard Kithil, "Some time ago we came to the conclusion that we had to spend upwards of 10% of our gross income on research for new compositions of matter which we could patent. By then we realized that we could get the protection we needed from the U.S. (not foreign) patent system, that is certainly not afforded us by our tariff policies.

"Three years after the program got under way we began commercializing products derived from our R&D. Since then we've done all right with things that foreign competitors are less apt to displace us as suppliers."

Gavin Urges Free Trade

But just as Kithil and others of SOCMA** advocate, demand tariff protection, others just as strongly propose the opposite: An open door free trade policy. One of these spokesmen is Lt. Gen. James M. Gavin, U.S.A. (ret.) now president of Arthur D. Little, Inc., who recently said before a national meeting of the A.C.S., "I firmly believe that American businessmen have more to gain from a reduction in foreign tariffs than they stand to lose from a lowering of our own tariff barriers...

"If we now push vigorously for a lowering of foreign tariff barriers, we may open up tremendous new market potentials for ourselves..."

But Dyestuffs Pose Problem

Such statements are by no means limited to the chemical industry, nor is the President's list of products which are under consideration for negotiation at GATT. The question is really one of whether or not the synthetic organic fine chemical industry of the U.S. can safely be part of the over-all exchange advantage pattern along with

** Synthetic Organic Chemical Manufacturers Association.

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

National Distillers Joins Shell International in Polyolefin Venture Abroad

A joint company has been formed by Shell International Chemical Company Ltd., London, and U.S.I.'s parent company, National Distillers, to develop plans for production and marketing of polyolefin film and packaging materials outside the U.S. and Canada. The new company operates from London.

National Distillers is one of the world's largest producers of polyethylene and owns the Kordite Company—a leading manufacturer in the U.S. of plastic film and packaging. It has recently set up a company in Switzerland to cover sales and development of polyethylene.

New Direct Halogenation Process Converts Impure Metal to Purified Halide

A safe and commercially adaptable process for the direct halogenation of crude metals—to obtain the corresponding halide substantially free of certain undesirable metal impurities—is covered in a patent recently issued to U.S.I.'s parent company, National Distillers. Metal halides which can be prepared by this process are those of the reactive metals such as titanium, zirconium, hafnium, columbium and tantalum.

As described in the patent, an impure feed such as scrap zirconium is safely reacted with a halogen gas by diluting the latter with an explosion-preventing proportion of helium, argon or neon. The reaction is carried out at 450°-900°C until 50-90% of the feed has been reacted. A metal halide is recovered which is considerably lower in metal impurity content than the original scrap feed. A typical analysis of $ZrCl_4$ prepared by this process is given in the following table:

COMPARATIVE METAL IMPURITY CONTENTS—METAL FEED VERSUS HALIDE PRODUCT

Metal Impurity	Low Hafnium Zirconium Scrap Feed*	$ZrCl_4$ Product*
Al	65	94
Cd	< 0.5	0.8
Cr	700	35
Fe	970	140
Mn	23	< 5
Ni	255	< 15
Pb	85	20
Sn	1.6%	188
Ti	< 20	< 20
U	< 10	< 10
W	< 20	< 20

Values in ppm based on zirconium unless otherwise stated

Ammonia Production, Storage Capacity Expanded by U.S.I.

Refrigerated, Non-Pressurized Storage Tank to be Installed

Ammonia production capacity has been increased by 17%, and anhydrous ammonia storage capacity will soon be expanded by U.S.I. at its Tuscola, Illinois, plant. The plant is already operating at the expanded rate of 70,000 tons per year (up from 60,000 tons) and a new 6,000-ton storage facility is expected to be in full service by the end of the year.

This increased production and storage capacity are needed to assure rapid delivery to U.S.I.'s ammonia, aqua ammonia and nitrogen solutions customers, especially during the heavy seasonal demand in early spring. Because of the plant's location in Central Illinois, heart of the Midwestern fertilizer industry, most of its output is used as a raw material in this highly seasonal business. Other applications for U.S.I. ammonia include chemical processing, refrigeration and miscellaneous industrial uses.

Storage Tank Uses New Principle

The new 6,000-ton storage tank will use the relatively new principle of storing refrigerated ammonia at atmospheric pressure, rather than storing in pressurized tanks at moderate temperatures. The storage vessel consists of an inner tank, 88 feet in diameter and 56 feet high, separated from an outer tank by 2½ feet of insulation. Liquid ammonia is stored in the tank at a temperature of about −28°F. and this low temperature is maintained by evaporation of ammonia from the surface.

The evaporated ammonia is recompressed, condensed and returned to the tank. It can also be used as feed stock for the adjoining ammonium nitrate plant.

Polyethylene — Aggregate Forms New Paving Material

A new paving material compounded of pigmented polyethylene and aggregate promises to bring color-coding of roads and runways closer to reality. It can be mixed and applied (in a one-inch layer) using conventional machinery and methods. Brilliant white test curbing, shown being installed in the photo above, defines road boundaries. Other possible uses include multi-colored home driveways, tennis courts, sidewalks, swimming pools.

New TVA Process Uses Wet-Process Phosphoric to Make Diammonium Phosphate

TVA engineers are developing a new process to make granular diammonium phosphate fertilizer. It is reported that the method can use low-cost wet-process phosphoric acid without a purification step.

By taking advantage of chemical heat in the reaction of acid and ammonia, recycle rates and drying requirements are reduced below those of some competitive processes, according to TVA. Grade of product depends on purity of phosphoric acid available, and ranges up to 21-53-0. The process is being adapted to production of various grades, some containing potash.

TVA claims that its ammoniator is the key equipment in the process. Wet-process phosphoric acid, such as that made by U.S.I. at Tuscola, Illinois, is partially

MORE

New Type of Carbon Black Obtained from Burning Hydrocarbons in Chlorine

Researchers have obtained high yields of carbon blacks containing chemically bonded chlorine, by burning various hydrocarbons in the halogen gas rather than in oxygen. Such chlorocarbon blacks may have commercial use in rubber and plastics compounding, according to a recent report.

In the study, methane, propane, ethylene and natural gas were burned with submaximal amounts of chlorine to yield carbon black as a major product. By

MORE

★ U.S.I. CHEMICAL NEWS ★

CONTINUED *TVA Process*

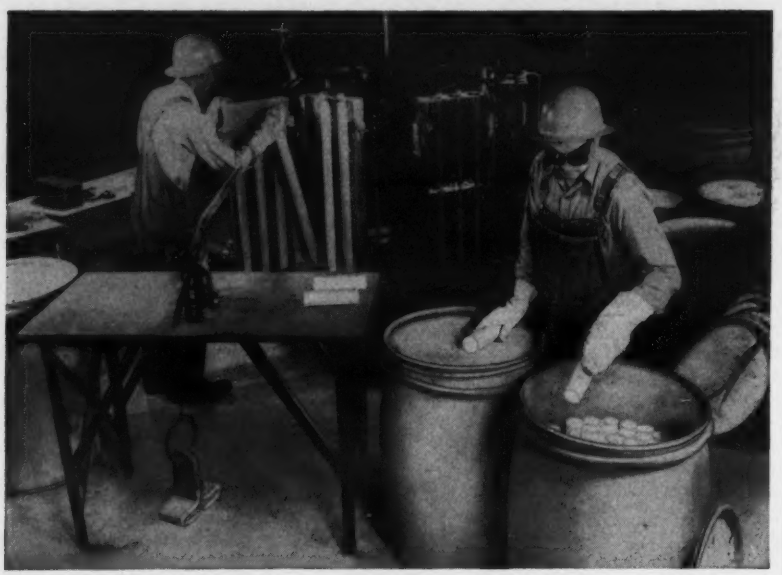
preneutralized in a tank. Then the ammoniation to diammonium phosphate is completed in the ammoniator-granulator drum. Excess ammonia must be fed to the drum to produce diammonium phosphate. Therefore, a scrubber is required to recover ammonia from exhaust gases. Phosphoric acid is fed to the scrubber to absorb ammonia, and the solution is fed to the preneutralizer. A recycle ratio of about 3:1 is required for control of granulation. Physical properties of the closely sized granular product are said to be excellent.

CONTINUED *Chlorocarbon Blacks*

contrast, carbon black is only a by-product when these hydrocarbons are burned with oxygen. The quantity of carbon produced in the chlorine-hydrocarbon flames seems to be directly proportional to the chlorine-hydrocarbon ratio. It also seems to depend on the hydrocarbon used, and is greatest for methane.

These carbon blacks can contain as much as 45% chlorine. The halogen appears to be bonded to the carbon chemically, researchers report, since all attempts to remove it have left at least 10% chlorine.

No Oil for Sodium Bricks



Sodium packed under kerosene? Perhaps in the laboratory but not in industry, as you can see from this photo of the cutting and packing operations at U.S.I.'s metallic sodium plant in Ashtabula, Ohio. Every year, many tons of sodium are molded into bricks and packed *dry* in steel drums. An airtight seal is maintained during storage and shipment.

All phases of sodium handling are discussed in the latest edition of U.S.I.'s brochure "Handling Metallic Sodium on a Plant Scale". For your copy, address Technical Literature Department, U.S.I. Chemical News, 99 Park Avenue, New York 16, New York.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Chlorine safety data sheet is now being sold by MCA for nominal price. Covers properties, hazards and their engineering control, employee safety, emergency measures, container handling, waste disposal, medical management. **No. 1640**

New group of urethane elastomers now offered for use where abrasion resistance is essential. Claimed more rugged than manganese steel and other metals. Suggested for chute linings, pipeline crawler wheels, scrapers, etc. **No. 1641**

Temperature-indicating crayons and paints now on market are said to check temperatures of hot surfaces by completely changing color. Series of products cover range from 104°F. to 2,462°F. Claimed easy to apply and remove. **No. 1642**

Sodium peroxide is covered in new data sheet giving specifications, typical analysis, properties, shipping data and uses. Technical service is offered on handling and use in pulp and paper, textile and other fields. **No. 1643**

New laboratory oven is said to give highest temperature, combined with vacuum, now available. Can heat from room temperature to 500°F. in one hour, in 11-inch diameter by 12-inch deep vacuum chamber. **No. 1644**

Dry sulfamic acid product—with built-in pH color indicator, corrosion inhibitors, anti-foams, wetting agents—can now be obtained for removal of lime scale deposits from evaporative condensers and cooling tower systems. **No. 1645**

Polyethylene waste and drainage system described in new engineering and parts catalog now available. Said to be complete, permanent, corrosion-resistant. Includes sinks, traps, pipe and fittings, adapters, other equipment. **No. 1646**

Concise conversion tables and circular slide rule now offered for chemical engineers, is shirt-pocket size. Includes slide rule, table of elements, temperature conversion chart, conversion factors, useful constants and data. **No. 1647**

***m*-Sulfobenzoic acid**—new intermediate for dyes, colors, color developers and couplers, surfactants, textile treating agents, flavors, drugs, preservatives, dehydrating agents—is subject of data sheet recently released. **No. 1648**

Fallout is subject of new book which can now be purchased. Book covers bomb types, meteorological dispersion and persistence of fallout, effects of radiation, radiation sickness, biological effects, nuclear war, civil defense. **No. 1649**

PRODUCTS OF U.S.I.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide. Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

Pharmaceutical Products: DL-Methonine, N-Acetyl-DL-Methonine, Urethan USP, Intermediates.

Ethyl Alcohol: Pure and all denatured formulas; Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®M, ANSOL PR

PETROTHENE® . . . Polyethylene Resins

MICROTHENE . . .Finely Divided Polyethylene Resin.

Animal Feed Products: DL-Methionine, MOREA® Premix (to authorized mixer-distributors).

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corporation
99 Park Avenue, New York 16, N. Y.

U.S.I. SALES OFFICES

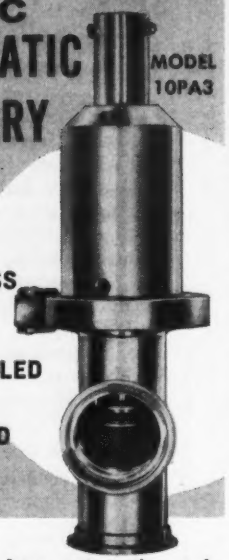
Atlanta • Baltimore • Boston • Chicago • Cincinnati • Cleveland
Detroit • Kansas City, Mo. • Los Angeles • Louisville • Minneapolis
New Orleans • New York • Philadelphia • St. Louis • San Francisco

Introducing the

A·P·C AUTOMATIC SANITARY VALVE

MODEL 10PA3

- STAINLESS STEEL
- PISTON CONTROLLED
- AIR OPERATED



Now you can have automatic, problem-free flow control of food and dairy processes with A-P-C's new remote operated sanitary valves. Highest sanitary standards and full C.I.P. cleanability.

Flow control with A-P-C's automatic, sanitary valves saves you money by cutting maintenance costs and eliminating product waste. There are no air losses to the product and no product leaks to the valve mechanism.

A-P-C'S new automatic sanitary valves are made of heavy duty stainless steel . . . precision made for long service life. Springless operation guarantees positive action and eliminates breakage problems. Valve position, either open or closed can easily be seen, even at a distance.

11PAA Series Valves—Available with 3 to 6 ports in many arrangements. The porting on this valve makes it useful for straight line header assemblies to raw and finished product storage tanks. Also ideal for filler header lines.

11PAE3 Diverting Valve — Up to five ports available on valve body. Typical application includes vat or tank selection; diverting finished product when surge tanks are filled or supplying alternate process lines.

The 10PA3 A-P-C Valve shown in main illustration and its companion valve 10PA are used as shut-off valves for filling and emptying vats and tanks. 10PATF, a flange outlet valve is also available for mounting on existing tanks and vats.

Ask your Creamery Package representative to demonstrate the A-P-C Automatic Sanitary Valve soon.

Sold Exclusively by the

Creamery Package **MFG. CO.** *for*

ALLOY PRODUCTS CORP.

1075 Perkins Avenue • Waukesha, Wisconsin

Check 1124 opposite last page.

such product items as sewing machines, electronics apparatus, and so on.

The western European dyestuffs industry is currently twice the size of ours. The comparable industry of eastern Europe and Asia is now even larger than that of western Europe, and is still growing. India is now supplying its own consumption, and Japan is beginning to export to the U.S. It's a much larger industry on the outside, seeking and getting portions of our markets.

Industry Needs Representation At GATT Meetings

In what way do our fine organic producers feel they are being most unfairly dealt with? By not being permitted to have industry technical specialists serving as advisors to the negotiators at the GATT conference. "Every other nation represented will have such people sitting right alongside their own negotiators," complains one industry tariff specialist.

When one considers more broadly the organization of industry-government relationships existent among the synthetic organic producing countries of the world, it becomes apparent that ours is the only country that still preserves the private enterprise — government separation of function which is so vital to our system.

"I am sure that General Gavin was speaking for a united and strong West," comments Dr. Ernest May, president of Otto B. May, small Newark, N.J., intermediates and dyes manufacturer. "However, this requires that we continue to have a strong domestic synthetic organic chemicals industry. Our Western competitors enjoy both export subsidies and cartel-minded governments in their common market area, along with cost advantages. Somehow, we must not only find ways to protect those of our industries which otherwise cannot survive if we are the only ones playing according to the rules of free enterprise." ■

EASIEST WAY TO MAKE ENDS MEET

VICTAULIC®

The Time-and Job-Proven Method of Reducing Piping Costs

NEW PLAINLOCK COUPLINGS AND FITTINGS

For Low Cost Jointing of Plain End Pipe

- Speed Installation — Save Time and Labor — Cut Piping Costs
- No pipe end preparation
- Positive grip of pipe ends
- Low cost couplings and fittings
- Join standard or light wall carbon or stainless steel, aluminum and other piping materials

CUT COSTS WITH OVER 1100 VICTAULIC ITEMS FOR BETTER AND EASIER PIPING

For complete information on any Victaulic product, write:

VICTAULIC COMPANY OF AMERICA

Dept. 82-11, P.O. Box 509, Elizabeth, N. J.

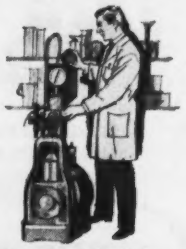
Check 1126 opposite last page.

GAULIN G.T.A.

Gaulin Technical Assistance

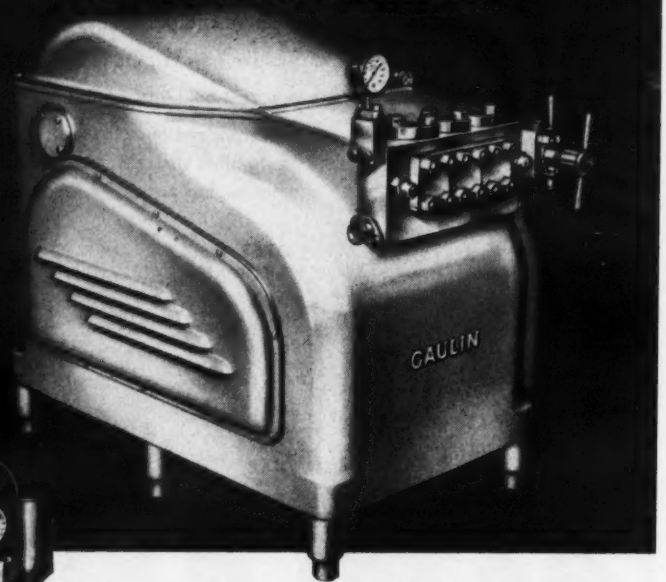
GTA Bulletins

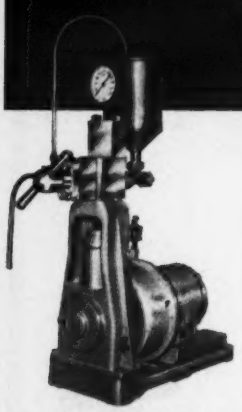
Technical Assistance



Laboratory Analysis

And Gaulin Homogenizers Provide the Practical Solution to Particle Control





What's the best method to disperse, emulsify or blend? You can get the right answer on the most effective method with Gaulin Particle Control. Not only will Gaulin Homogenizers improve product uniformity, stop separation, accent taste, speed chemical reactions, but they will increase salability of products and cut costs.

Take advantage of Gaulin Technical Assistance, too. It provides free technical data, experienced advice and laboratory analysis. Write for GTA Bulletins . . . Homogenizers H-55, Sub-Micron Dispersers SMD-55, and Colloid Mills C-57.

Try Particle Control in Your Plant . . . Rent a Gaulin Laboratory Homogenizer for Only $75.00 Per Month!

This versatile Machine reduces ingredients in your product to ultimate particle size . . . Minimum sample one pint; Capacity 15 GPH; Pressures up to 8000 psi. Rental costs applicable against purchase price. Write for Bulletin LH-55.

Gaulin

MANTON

Gaulin

55 Garden Street **Everett 49, Mass.**

World's largest manufacturer of stainless steel reciprocating, rotary, pressure exchange pumps, dispersers, homogenizers and colloid mills.

Ask GTA...

Gaulin Technical Assistance—for data on the complete Gaulin line: Homogenizers, Colloid Mills, Submicron Disperser, Triplex High Pressure Pumps and HX Pumps. Get GTA from your nearest Manton-Gaulin Representative . . .

Akron 8, Ohio
White Industrial Sales and Equipment Company
919 Second National Bldg.
Birmingham 6, Alabama
D. B. Gooch Associates, Inc.
5018 First Avenue, North
Boston, Mass.
Joseph H. Bertram & Company, Inc.
570 Hillside Avenue
Needham Heights 94, Mass.
Buffalo 6, N. Y.
A. W. Johnston Co.
2021 Clinton St.
Calgary, Alberta
Harvey Carruthers, Limited
122 17th Avenue, S.E.
Charleston 1, West Va.
White Industrial Sales and Equipment Company
1033 Quarrier Bldg.
Chicago 6, Ill.
Fuente and Webster Inc.
549 West Randolph St.
Cincinnati 2, Ohio
White Industrial Sales and Equipment Company
140 West Sixth St.
Clearwater, Fla.
Johnson Roney II and Associates
P. O. Box 26
Cleveland 20, Ohio
White Industrial Sales and Equipment Company
3639 Lee Road
Detroit 36, Mich.
H. A. Reed Company
19465 James Couzens Highway
Denver 18, Colorado
Alldredge & McCabe
847 East 17th Ave.
Houston 2, Texas
Edward Soph Company
768A M & M Bldg.
Indianapolis, Indiana
Avels Sales & Engineering Co.
1407 E. Riverside Dr.
Los Angeles 39, Calif.
E. M. Underwood and Company
2901 Rowena Avenue
Minneapolis 3, Minn.
George R. Mellema Co.
620 Plymouth Bldg.
Montreal, P. Q.
Richardson Agencies Ltd.
1244 Bois Frank Blvd.
St. Laurent, Montreal
Newark, New Jersey
Frederick E. Herstein & Associates
Benninger Building
1429 Route 22
Mountainside, N. J.
New York City 24, N. Y.
Kenneth S. Valentine Inc.
111 West 83rd St.
Oakland 11, California
E. M. Underwood and Company
4385 Piedmont Ave.
Philadelphia, Pennsylvania
R. W. Fox Company
P. O. Box 196
Newtown Square, Pa.
Pittsburgh 22, Pa.
White Ind. Sales and Equipment Co.
612 Farmers Bank Bldg.
Portland 14, Oregon
The Burhans-Sharpe Co.
Weatherly Building
St. Louis 8, Missouri
Wharton L. Peters Machinery Company
3863 West Pine Blvd.
Seattle 4, Washington
The Burhans-Sharpe Co.
1731 First Avenue, S.
Toronto, Ontario
Richardson Agencies Ltd.
164 Bentworth Ave.
Postal Address: P. O. Box 8, Station T,
Toronto 19, Ontario
Tulsa, Oklahoma
Edward Soph Company
202 East 18th St.
Vancouver 9, B. C.
Harvey Carruthers, Limited
1639 West 5th St.
West Hartford 7, Conn.
Joseph H. Bertram & Company, Inc.
998 Farmington Avenue

Check 1127 opposite last page.

Overseas Plants

From page 37

Carbide Makes Polyethylene in Several Countries

Union Carbide International Company, Union Carbide's export division, has an active program for building abroad, and is making or soon will make polyethylene in Australia, Belgium, Italy, India and Scotland. Capacity is being doubled in Italy and Scotland. Company also makes a large number of other chemical products abroad, operating plants in all parts of the world.

W. R. Grace Overcomes Barriers By Building Abroad

W. R. Grace & Company has a rapidly expanding overseas building program, with 12 plants in nine foreign countries. Company builds plants abroad to avoid economic barriers or to serve customers better. When it becomes imperative to do this, company builds overseas plants rather than lose the business.

Major Carbon Black Producers Move Overseas

Principal U. S. carbon black manufacturers are moving rapidly to set up overseas production operations. Reason is that the rubber industry, which takes 95% of carbon black output, is expanding twice as fast overseas as here. Majority of plants will be built in the Common Market countries and in Japan. Among the companies actually engaged in this program are Witco Chemical Company, Continental Carbon Company, Columbian Carbon Company, United Carbon Company and Godfrey L. Cabot.

Among other companies actively engaged in building chemical plants abroad are Hooker Chemical, Koppers, Texas Butadiene, Goodyear, Goodrich, Firestone, Petroleum Chemicals, Amoco, Esso Standard Division of Humble Oil, Oronite Chemical and Tidewater.

In general, chemical companies should consider building overseas plants if warranted by specific situations

and not just because it is fashionable at the moment. Careful consideration should be given to the market for the product, rate of return on investment, industrial climate in country, political situation and a number of other factors.

Although each possible foreign plant should be studied in great detail, it would be an error to just wait until world conditions become more settled or to see how the Common Market progresses. Any company that waits too long will find that attractive opportunities have been seized by others. ■

Old arsenic prejudice rebuffed by research

Multiple-generation studies with laboratory and farm animals show that uses of organic arsenicals in medicated feeds pose no hazard to public health, an Abbott Laboratories researchist reports.

To the contrary, animals receiving arsanilic acid show better growth and survival than those fed no arsanilic acid, Dr. Douglas V. Frost, head of nutrition research for Abbott, declares.

It is biologically impossible to raise the level of arsenic residue in healthy animal tissues above a level averaging one ppm, he added.

"I got the idea grilling steaks one night."

What's so special about the huge fractionating tower shown here? It is one more example of how Sun Ship builds and delivers heavy industrial equipment on barges or sea-going vessels, with careful attention to such requirements as safety and on-time schedule.

Whether it's a fractionating tower or key structural part for industry, transporting big items by water or by rail is strictly routine for Sun Ship, for we build and deliver what's needed in many fields. If you have a machinery or heavy equipment problem, write to us about it.

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE • SINCE 1916 • CHESTER, PA.

Check 1128 opposite last page.

for GRINDING AND DEHYDRATION
FINER PARTICLES
LOW MAINTENANCE

FLUID ENERGY JET MIZER MILLS

The Fluid Energy "Jet-O-Mizer" Mill, designed and built by the pioneers in fluid energy fine grinding, does far more than produce fine particles. It controls fineness and product quality with a narrow distribution range and simultaneously with grinding can dehydrate, coat particles, blend and achieve chemical changes.

Jet-O-Mizer Mills are being used all over the world, processing many types of materials in the following industries:

• Abrasive	• Food	• Pigment	• Wax
• Insecticide	• Mineral	• Plastic	• Metal
• Ceramic	• Pharmaceutical	• Carbon	• Chemical

"Jet-O-Mizing" produces **FINE PARTICLES** ¼ micron average and above **PLUS** . . . Narrow Particle Distribution • Dry, or Controlled Moisture Content • Continuous Operation • Uniformity of End Product • Other Operations with Grinding • No Attritional Heat — No Moving Parts • Low Operating Costs • Low Maintenance

Send for complete information on Fluid Energy's "Jet-O-Mizer" Mills, "Jet-O-Clone" Dust Collectors, and TESTING AND CUSTOM GRINDING services.

FLUID ENERGY PROCESSING & EQUIPMENT COMPANY
Richmond & Norris Streets, Philadelphia 25, Pa. • Phone: Regent 9-7728
(Formerly known as the Wheeler-Stephanoff Mill)

Check 1129 opposite last page.

Creative Research

From page 45

in its research program. During 1959, the company was granted 427 U.S. patents, ranking close to the top among American corporations. Moreover, many of the Phillips patents have been of major significance in such fields as polyethylene plastic and polybutadiene synthetic rubber.

One reason for Phillips' success in research is its excellent employment program for scientific personnel. (See article starting on page 33 of the June 1959 issue of CHEMICAL PROCESSING.) Program stresses such points as professional recognition, promotion based on performance, good working conditions and an equitable salary plan. This program attracts top scientific personnel and minimizes turnover.

A unique feature of Shell Oil is that its research activities have been placed in a separate wholly-owned subsidiary, Shell Development Company. About 25% of Shell Development's program is devoted to basic research. A large part of the company's R&D activity goes into petrochemicals. Research activities have given Shell leadership in many fields such as those of synthetic glycerine and polyisoprene synthetic natural rubber.

Other petroleum companies have set up separate chemical subsidiary companies so that research here can be oriented toward chemicals rather than toward gasoline. This is a major step in lessening the chance of overlooking or incorrectly evaluating the significance of chemical discoveries.

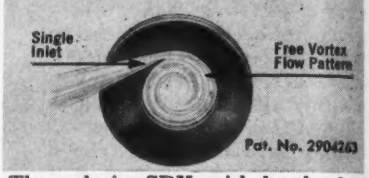
This discussion has pointed out examples from some companies that are striving to increase creativity in industrial chemical research through various methods. No attempt has been made to survey completely the outstanding creative research efforts of all companies concerned with chemicals.

If you know of any unusual, effective methods for fostering creativity, we would like to hear about them for possible future coverage in our series on "Creativity & Survival." ■

DELAVAN'S
SDX
CARBIDE
SPRAY
DRYING
NOZZLE

with new advanced design

EXCLUSIVE SWIRL CHAMBER



The exclusive SDX swirl chamber has a single inlet spiral configuration which produces a natural, free vortex flow pattern. This pattern minimizes friction, adds to the nozzle's long life, and improves its spray characteristics. The special patented chamber is made of hardened stainless steel. The SDX's orifice disc and back plate are made of tungsten carbide, another feature which contributes to the nozzle's long life — a fact which has been proved in laboratory and field tests. The durable SDX is the ideal nozzle for highly abrasive materials.

BETTER ATOMIZATION
The SDX produces a uniform hollow cone spray pattern with exceptionally uniform particle size distribution. It has the added advantage of offering excellent atomization at lower operating pressures.

CERTIFIED PERFORMANCE
The flow rates on Delavan SDX nozzles are certified to be within ±5% of rated capacity, tested on water at 1000 psi. Spray angles are certified to be within ±5° of rated spray angle. This certification is your assurance that Delavan SDX nozzles will perform as rated.

WIDE CHOICE OF CAPACITIES AND SPRAY ANGLES
The SDX nozzle is available in a full range of flow rates, each rate furnished as standard in several spray angles. Matching the flow rate and spray angle in your dryer often means greater efficiency and a better end product.

Write for a copy of Delavan's descriptive Spray Drying Catalog.

DELAVAN
Manufacturing Company
WEST DES MOINES, IOWA
"World's largest manufacturers of nozzles"

Check 1130 opposite last page.

Higher-grade product, safer operation, lower costs realized as . . .

Continuous mixer KO's Polaris fuel bottleneck

A continuous mixer, which appropriately resembles a cannon, is bolstering the nation's defense by eradicating a bottleneck in the production of solid propellant fuel for the enemy-deterring Polaris missile.

Employed by Aerojet-General Corporation in its Sacramento, Calif., Solid Rocket plant, use of the mixer is hailed by the U. S. Navy as "the first large-scale application of the continuous-mixing process (to solid propellants) — far superior to existing batch-mixing operations."

A checklist of accomplishments credited to the machine would look like this:

- **Volume of output stepped up in a ratio of nearly 3-to-1.**
- **Labor costs/lb reduced by more than 80%—18c for batch method as compared to 3c for continuous.**
- **Better quality control—continuous monitoring instead of batch sampling.**
- **Safety hazards minimized by remote operation, mixing of smaller quantities.**

In the process, which Aerojet perfected in less than a year under Navy contract, the mixer "collects" a continuous stream of carefully metered propellant ingredients from several sources, processing the materials through its "barrel."

Machine consists essentially of a worm blade revolving in a trough inside the 5"-diam cylinder. Blade has gaps at regular intervals that correspond to kneading teeth in the trough.

Worm blade is operated by a driving gear that produces a horizontal movement so coordinated with the rotary motion of the blade that the gaps meet and pass the kneading teeth as the worm revolves.

Material entering machine is forced forward by the worm blade until it comes to a kneading tooth. As blade passes tooth, it forces a part of the material with it, leaving remainder behind for further mixing.

Repetition of process along length of trough enables each tooth, working with gaps in the worm blade, to act as individual mixing machine.

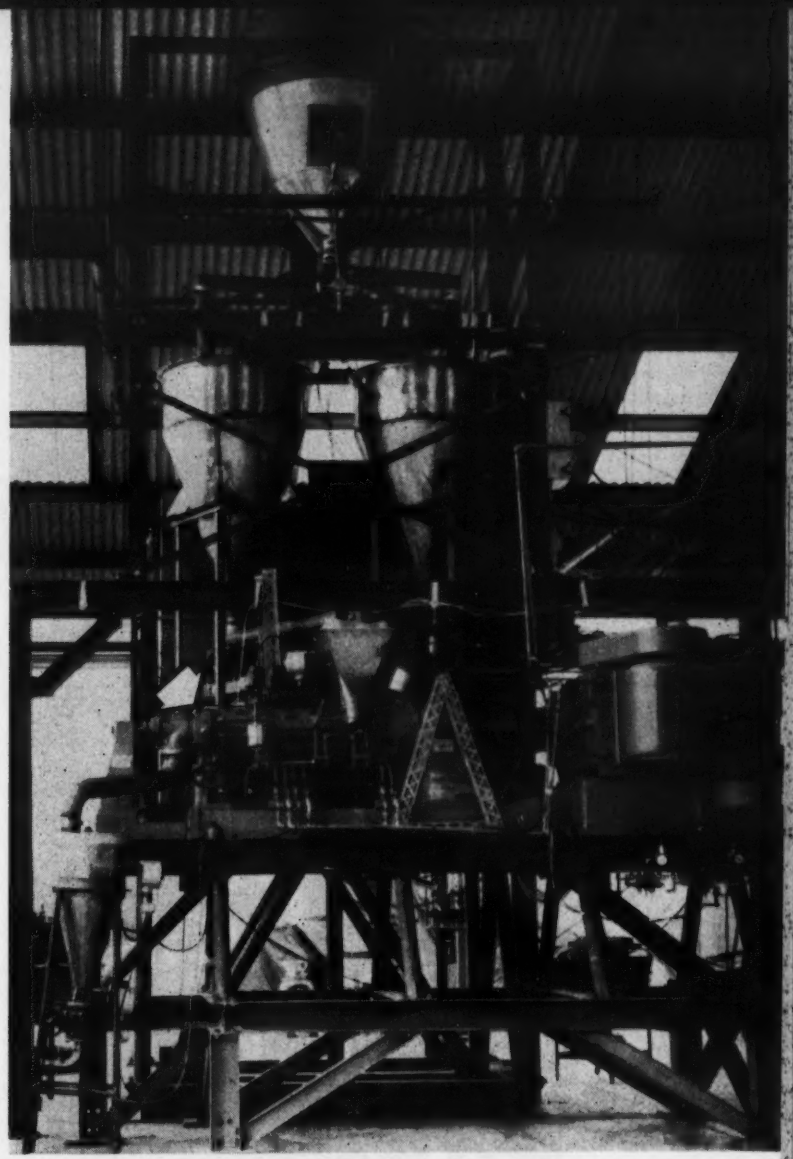
The ingredients thus mixed into a high-energy rocket fuel include an oxidizer, main fuel and final fuel which are delivered from the water-jacketed barrel (controlled) at 80°F) at 5000 cps viscosity.

Paste-like propellant passes four stream analyzers which continuously monitor quality of the mixture before it is discharged into batch buggies. These carry it to casting area where it is placed in rocket casings and cured.

This quality control feature enhances the value of the mixer — which makes such control possible — considerably in the eyes of Aerojet engineers. Under the batch method, only 10 lb of propellant could be tested from a 2200-lb batch.

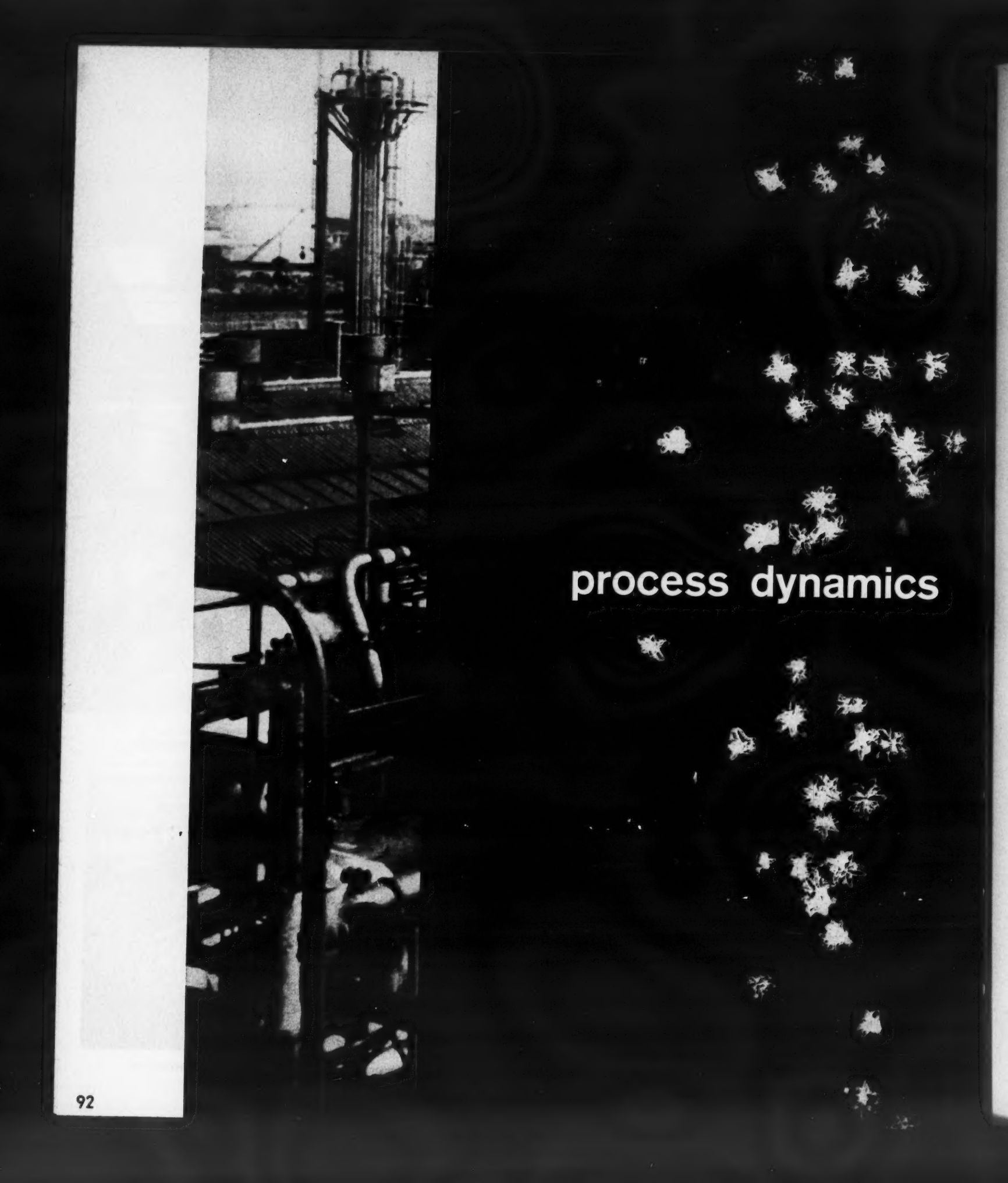
The size of the batch also posed a formidable safety problem—comparable to coping with a potential 2200-lb bomb.

To page 93



Pilot plant facility, developed by Aerojet-General, leading to continuous solid propellant fuel plant for Polaris missile. Horizontal shape (arrow) is barrel of mixer

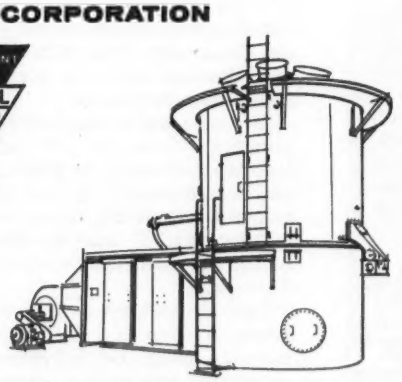
Artist's conception of continuous mixing facility now in production


process dynamics

Why settle for equipment when you can buy production?

Big bold concept—process dynamics.
General American's contribution to process dynamics is coordinated equipment. The end result is production.
So why settle for individual pieces of equipment when you can buy production . . . better, more controlled, more dependable production—probably for less money.
General American's wide diversification assures you of the *right* components, properly coordinated right from the start. Extensive General American laboratory and testing facilities enable us to set up pilot operations before you invest one penny.
If you'd like to buy production rather than just equipment, why not talk to General American about coordinated equipment?
It pays to plan with General American

Process Equipment Division
GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South LaSalle Street • Chicago 3, Illinois
Offices in principal cities
blowers • chemical nickel plating • compressors
conservation systems • conveying systems • coolers
crushers • cryogenic equipment • crystallizers • dewatering
presses • dryers • dust control equipment • evaporators
extraction equipment • fans • fractionating columns • gas
absorbers • gasholders • mixers • preheaters • pressure
vessels • pumps (gas and vacuum) • reactors • rock product
processing equipment • storage tanks (floating, fixed and lifter roofs)
field erection facilities available nation-wide



Louisville Process Equipment—Turbo-Mixers—Traylor Engineering—Fuller Company—Dracco Sutorbilt—Kanigen®—Plate & Welding—Wiggins Conservation Structures—Field Erection

Check 1131 opposite last page.

Continuous Mixer

From page 91

With continuous mixing, only 20 to 25 lb of propellant are under preparation at any given moment and this is retained in the mixer for a matter of minutes only.

In the batch procedure, loading, mixing, discharging and cleaning total up to a cycle time of 4 to 8 hr.

Only Five Operators

In addition, fewer personnel are involved in the new continuous operations. Five operators run the entire process, with critical areas monitored by closed-circuit television. A comparable batch system would require 28.

Although maintenance is not extensive on either method of production, the continuous mixer can be torn down and mixing screw and barrel replaced in a day.

The all-stainless-steel housing opens along top axis for complete cleaning at the end of the production period.

(Ko Kneader continuous mixers are products of Chemical Machinery Div., Baker Perkins, Inc., Saginaw, Mich.)

Check 1132 opposite last page.

Particle-size analyzer uses C14 as radiation source

A major breakthrough in particle size analysis is claimed for nuclear-type analyzer designed for use in industry and laboratory.

The analyzer is based on a beta-ray, back scattering technique which measures magnitude of fluctuations or "spread" in a ramdom sampling operation under specific geometrical conditions.

Its source of radiation is Carbon 14 and its sensitivity range—one to 500 microns. Data is provided in minutes.

(Radioisotope particle analyzer is development of Evans Research and Development Corporation, 250 E. 43rd St., New York 17, N.Y.)

Check 1133 opposite last page.

PROPELLAIR®
Ventilating Equipment

Cutaway shows design features of the Sky-Blast

Free-Flow SKY-BLAST® Roof Ventilators are *WEATHERPROOF!*

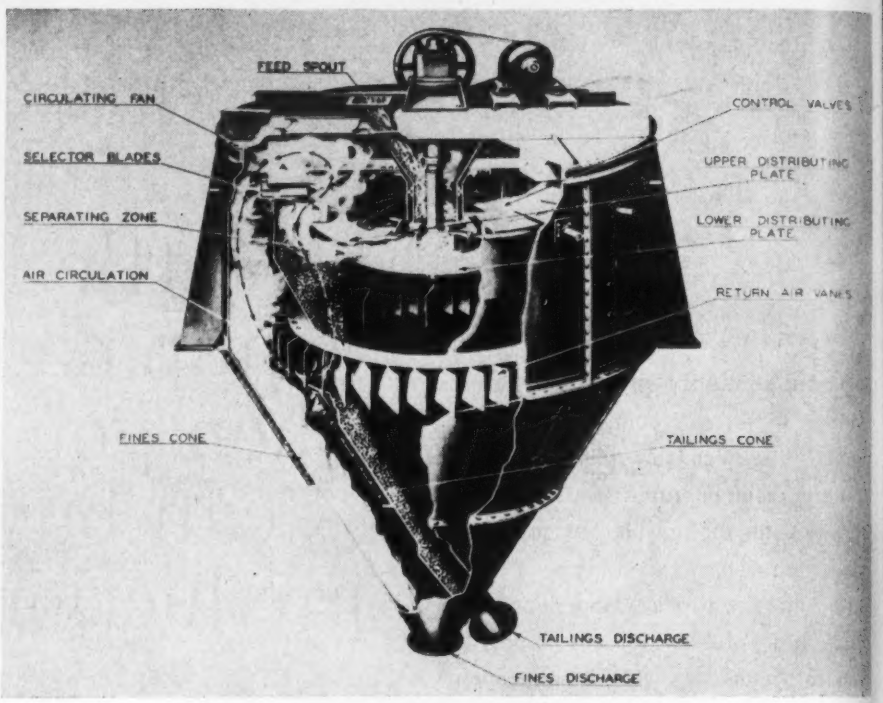
Even if the rain comes down in buckets, there's no need for weather covers on SKY-BLAST roof ventilators. In operation, the powerful airstream keeps out snow, rain and sleet. At rest, butterfly dampers form a water-tight seal, won't leak a drop. With no interfering covers, more air is moved at less cost. Fumes are thrown high in the air to prevent re-entry into the building and to eliminate roof maintenance problems created by other types of ventilators. Wind velocity or direction can't affect performance. Heavy gage steel surfaces are hot-dip galvanized for real sou'wester protection. With patented, non-clogging rainshed, low wind guard, rugged base and condensate drain, it's always fair weather beneath a SKY-BLAST. Wind tunnel proven ratings to 78,000 cfm. Send for bulletin 680—CP

PROPELLAIR®
Div. of Robbins & Myers, Inc., *Springfield, Ohio*

DIRECT CONNECTED | SKY-BLAST® ROOF VENTILATOR | TUBEAXIAL and VANEAXIAL | EXTENDED SHAFT | BELT DRIVEN | MAN COOLERS

MOVING AIR IS OUR BUSINESS®

Check 1134 opposite last page.



Schematic shows operation of air separator which broke quartz processing bottleneck

Air separator solves missile program snag

Steps up production of quartz for heat-shielding material in re-entry nose cones

Problem: Successful performance of experimental-design re-entry nose cones on Titan and Atlas ICBMs earlier this year focused attention on a formidable production bottleneck.

The nose cones, designed by Avco Corporation's Research and Advanced Development Division at Wilmington, Mass., and manufactured by the Lycoming Division at Stratford, Conn., are protected by Avcoite, a heat-shielding material which can withstand temperatures up to 12,000°F.

One of the ingredients used in formulating Avcoite is quartz which for this purpose must be pulverized from 4" chunks to low micron sizes.

For the experimental work this was accomplished by jaw-crushing the chunks to fractional sizes; pulverizing the fractions; screening the pulverized material; re-pulverizing and re-screening until the desired quantity was attained. Fines output from this time-consuming procedure amounted to pounds per week.

With demand upsurging as a result of the successful tests, Lycoming engineers were forced to find a way to expand production.

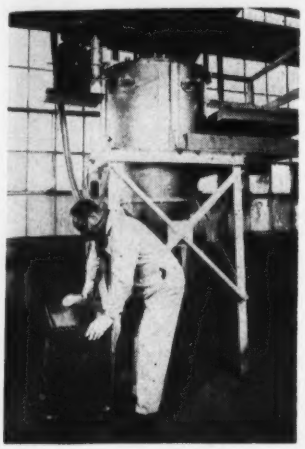
Solution: The screen was replaced by a 3'-diam centrifugal air separator. Capacities of the jaw crusher and pulverizer in use were already adequate for meeting the increased requirements.

Pulverized quartz is introduced into the separator and carried to the center of a revolving distribution plate which sprays the material off its outer edge in an even, horizontal, circular whirlpool.

A fan sucks the finer particles from this stream and carries them upward

through a large top opening. The lower distribution plate whirls the upcoming material, forcing the coarser sizes away from the opening.

Centrifugal force and air currents can be regulated and controlled by simple adjustments. Collection efficiency can be changed by adding or removing vanes. Air flow may



Separator in operation at Lycoming plant. Protective covering plus filter guards 10-hp motor (upper left) against dust impregnation

be retarded or increased by adjusting the control valve rods which can be seen protruding from separate side.

Tailings are repulverized with other feed. Collected fines pass through a magnetic separator where any entrained metallic substances are removed.

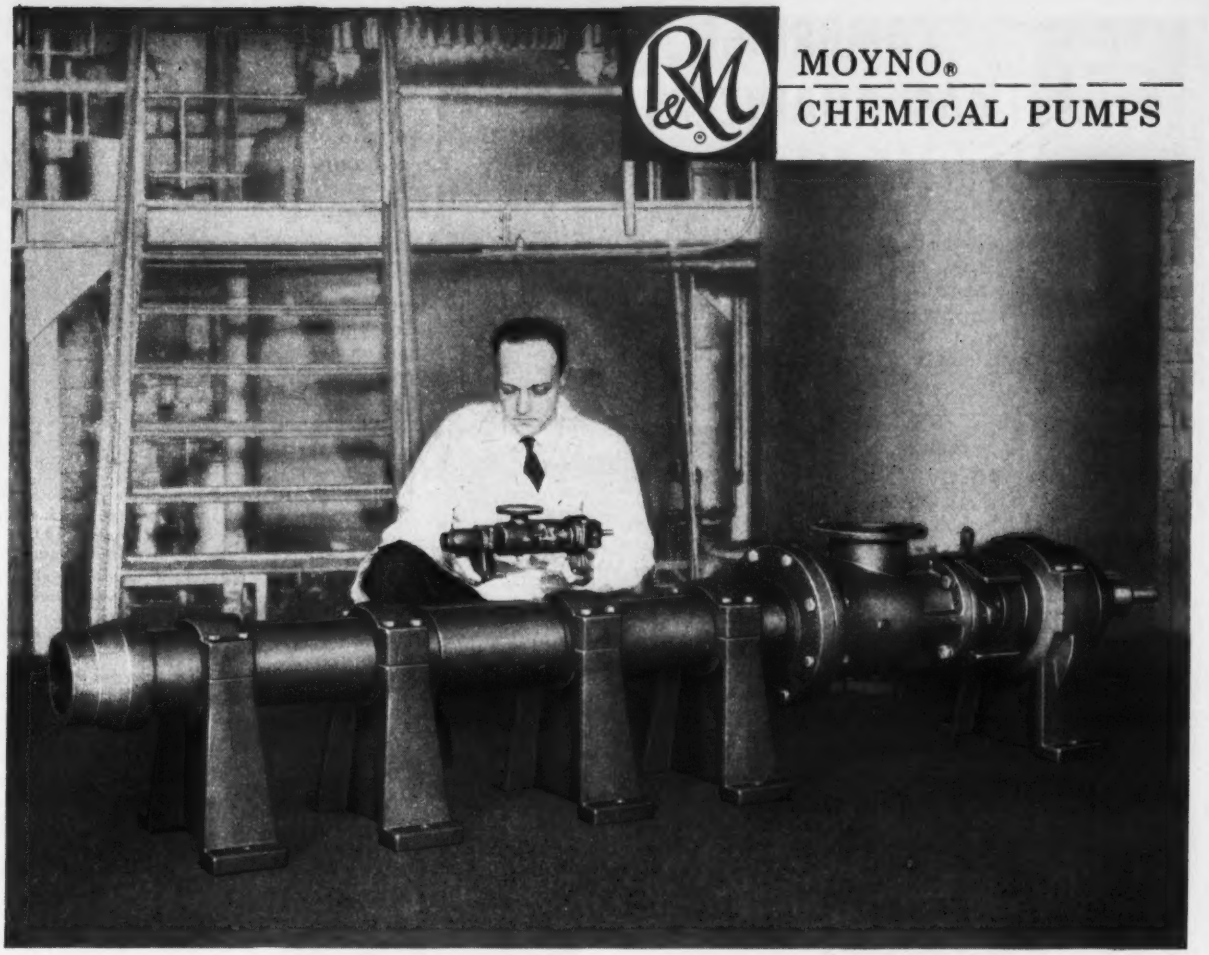
The fines are then leached and oven-dried prior to blending with other materials.

Results: Quartz processing ceased to be a limiting factor in Avcoite production. The amount of quartz fines collected spurted from pounds per week to pounds per day.

Fines which in screening would have been trapped with oversize material were sorted out in the air stream of the separator, reducing handling.

(Air separator is described in Bul 087, published by the manufacturer, Sturtevant Mill Company, 119 Clayton St., Boston 22, Mass.)

Check 1135 opposite last page.



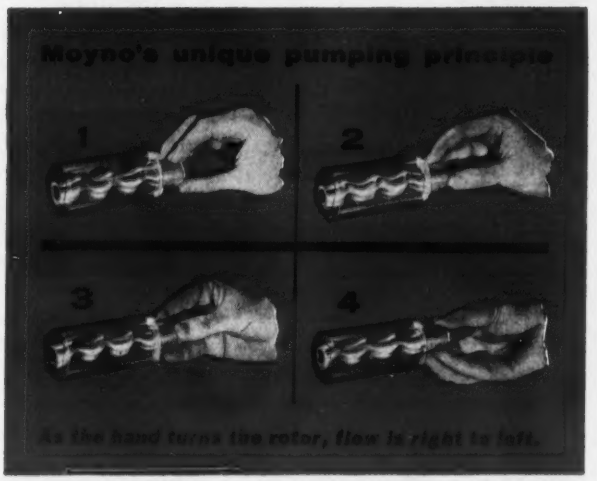
MOYNO®
CHEMICAL PUMPS

MOYNO® PUMPS ***capacities: from 1/100 to 500 gpm pressures: up to 1000 psi***

MOYNO pumps are available in nine sizes with capacities ranging from minimum metering flow to 500 gpm and pressures from zero to 1000 psi. Positive displacement delivers uniform discharge without pulsation, agitation or turbulence. Solutions ranging from thin watery slurry to extremely viscous paste, corrosives, abrasives and even solids in suspension are economically handled without excessive pump wear.

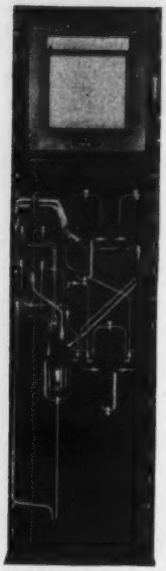
MOYNO's unique *"progressing cavity"* principle with only one moving part and special resistant internal parts slashes pump maintenance costs on problem chemicals that often ruin other pumps. Almost any substance that can be forced through a pipe can be pumped by a MOYNO.

To learn how a MOYNO can cut your pumping costs, see our product information in *Chemical Engineering Catalog*, or write today for Bulletin 30 CP.



ROBBINS & MYERS, INC.
motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps
SPRINGFIELD, OHIO · BRANTFORD, ONTARIO

Check 1136 opposite last page.



3-POINT RECORDING GAS ANALYZERS (Co_2,H_2,CO)

CAMBRIDGE GAS ANALYZERS

Labor saving—profit producing!

Cambridge Gas Analyzers continuously analyze and simultaneously record on one chart from one to six constituents of a gas. They may be used for most simple and many complex mixtures of gases. Dependable and labor-saving, these Analyzers make possible increased efficiency and savings in the operation of steam generating plants, cement kilns, blast furnaces; in the production of inert gases; in metallurgy, in petroleum refining and other chemical processes.

Send for literature mentioning application

CAMBRIDGE INSTRUMENT COMPANY INC.

1618 Graybar Bldg., 420 Lex. Ave., N.Y. 17, N.Y.

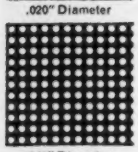
PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS

Check 1137 opposite last page.

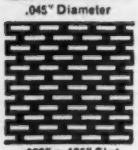
H&K Perforated Screens

for Grading Sieving Dewatering Filtering Straining • Sterilizing and Tote Baskets

.020" Diameter



.045" Diameter



.028" x .125" Slot

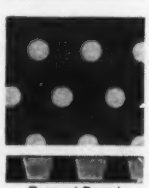
FIND NEAREST H&K AGENT in the 'Yellow Pages'

Listed Under "Perforated Metals"

H&K perforated screens are furnished, to customer order, with holes accurate and uniform in size, shape and spacing. The screen resists blinding as burr-free holes are slightly larger at the bottom. H&K perforated screens can be furnished with margins or unperforated areas in practically any material desired.

H&K specializes in the perforating of stainless steel, monel and other corrosion-resistant alloys.

Contact either H&K office or an H&K agent. Let us work with you on your perforated screen requirements.



Tapered Round Holes in Steel

No. 3 Diagonal Slot

Write for H&K General Catalog

THE Harrington & King PERFORATING CO. INC.

Chicago Office and Warehouse 5636 Fillmore St., Chicago 44

New York Office and Warehouse 110 Liberty St., New York, N. Y.

Check 1138 opposite last page.

Prilling tower is one-third as tall as conventional ammonium nitrate units

Process utilizes almost anhydrous melt

One feature of ultra-modern $5 million fertilizer plant which California Spray-Chemical Corporation put on stream recently at Kennewick, Wash., is a prilling tower one-third the height of conventional towers.

The tower is part of ammonium nitrate prilling plant which prills an almost anhydrous ammonium nitrate melt,

Modern nitric acid plant, part of California Spray-Chemical Corporation fertilizer complex at Kennewick, Wash., is equipped with electric motor-driven centrifugal compressor and expander turbine

thus requiring a very short distance of free fall for the pellet to completely solidify. Ammonia nitrate solution is prilled at concentration of 95 to 96%.

In the process, ammonia is vaporized by steam from the stack of the neutralizer and sparged into body of the neutralizer along with nitric acid. A ratio controller automatically maintains the proper proportions.

Neutralization heat evaporates part of the water giving a solution of 83% ammonium nitrate. This liquor is pumped to a single stage evaporator.

Final evaporation to above 99% is accomplished in a falling film evaporator located atop the tower. Melt flows

Same formula as famous Kroil that has pleased 14,000 industrial users for 10 years or more.

Loosens stuck together metal parts, bushings, bearings, bolts, screws, pipe, etc., "anything from an embalmer's needle to a bulldozer," one customer said.

"Like an extra employee," said another. "Turned rust into mush, put $50,000 equipment back to work."

You too can get these results.

Try Aerokroil at our risk. Send $2 cash, and we'll pay postage.

KANO LABS. 1051 S. Thompson Lane Nashville 11, Tenn.

12-OZ. CAN $2. F.O.B. NASHVILLE CASE OF 12 $18.75

Check 1139 opposite last page.

Variable Speed Drive Output adjustable from 0 to 150 ml/sec.
"MIDGET" Constant Discharge 2 to 20 cc/sec. range
Fixed Capacities 11 to 228 ml/sec; 10 to 217 gph.

MAISCH

METERING PUMPS

- COMPLETELY SANITARY, STAINLESS STEEL CONSTRUCTION.
- POSITIVE DISPLACEMENT—SMOOTH, UNIFORM, NON-PULSATING FLOW.
- PUMP HEADS DEMOUNTABLE WITHOUT TOOLS . . . FOR INSPECTION, CLEANING AND STERILIZING.
- DISPENSE BOILING-HOT OR ICE-CALD WATERY LIQUIDS OR HIGHLY VISCOUS FLUIDS.

Maisch Metering Pumps are simple in design, ruggedly built for long service, and can be depended on to maintain accuracy indefinitely. Exclusive design features insure optimum performance. Particularly suited for handling chemicals, syrups, oils, glue, processing solutions, etc. Quick demountable or fixed heads. Fixed capacity pumps available in wide range of output. Pumps in stock for immediate delivery. Write for complete details and prices.

mechanical mp products

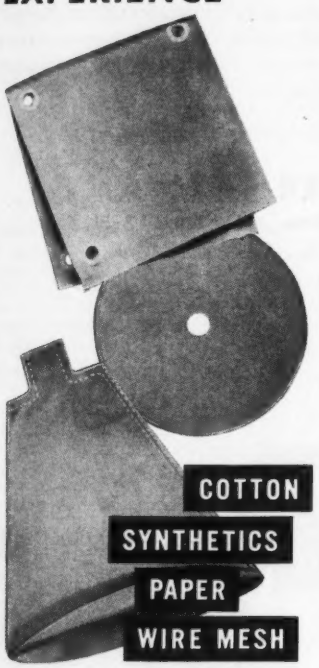
[illegible] PRODUCTS CORPORATION

1722 WEST HUBBARD STREET, CHICAGO 22, ILLINOIS

Check 1140 opposite last page.

FOR *Filter Media*
FOR YOUR SPECIFIC JOBS

CALL ON
SHRIVER
RESOURCES AND EXPERIENCE



We can meet your needs in filter media not only for filter presses but for other types of filters as well.

Cotton or synthetic materials, woven or felted, are available in rolls or prefabricated. There is also a wide selection of filter paper from factory stock.

We can also supply perforated metal sheets and wire cloth or screens to your requirements.

Write for Bulletin 141.

T. SHRIVER & CO., Inc.
846 Hamilton St., Harrison, N.J.

Check 1141 opposite last page.

through spray nozzles and downward through the tower. Air is drawn upward by fans at the top of the tower, cooling and solidifying the melt into prills or pellets of desired range of sizes.

Prilling plant is part of segment of facility which also includes solutions section and ammonium nitrate solutions plant. This portion of facilities can produce 150 tons of fertilizer grade prilled ammonium nitrate and simultaneously ammonuim nitrate-ammonia solutions and other fortified nitrogen solutions.

Kennewick installation also includes nitric acid plant with 150 tons/day capacity of nitric acid on 100% basis, produced at 57% concentration, and complex fertilizer plant.

(Three major segments of Kennewick plant were designed and constructed by The Chemical and Industrial Corp., 256 McCullough St., Cincinnati 26, Ohio.)

Check 1142 opposite last page.

Sr^{90} extraction process may reduce nuclear waste disposal

Could be used to isolate isotope from spent fuel

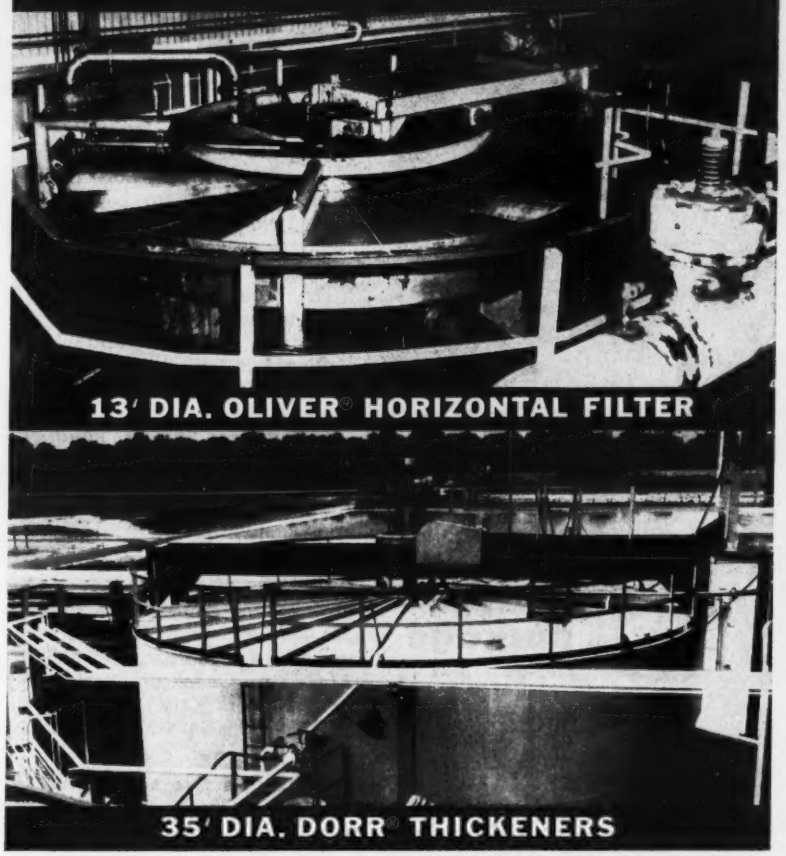
Chemical extraction method which makes possible more accurate measurement of strontium-90 in soil samples promises ultimately to reduce costs of nuclear waste disposal.

Process was developed by G. W. Mason, D. F. Peppard and Sonia McCarty, Argonne National Laboratory, Argonne, Ill., under auspices of the Atomic Energy Commission.

Sr^{90} measurement is complicated because calcium is present in samples of soil and vegetation, and calcium and Sr^{90} behave chemically in almost identical fashion.

Argonne process makes it possible to separate strontium and calcium, thereby improving accuracy with which the Sr^{90} content of samples can be determined. Since Sr^{90} decays radioactively into yttrium-90, it is possible with extraction

Dorr-Oliver equipment in . . .
ELECTROLYTIC CAUSTIC SODA PRODUCTION
at Wyandotte Chemicals Corporation



The adaptability of Dorr-Oliver equipment for specialized chemical processing operations is illustrated at the modern plant of the Wyandotte Chemicals Corp. at Geismar, La. The plant produces caustic soda and chlorine from brine by the electrolytic process.

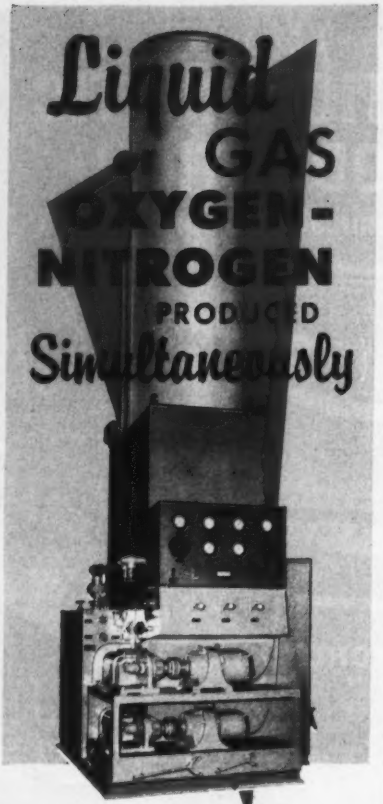
A 13' dia. Oliver Horizontal Filter, specially fabricated of nickel, is used to separate approximately 40,000 lbs. per hour of sodium chloride crystals from a saturated salt solution. Filter cake is continuously removed by a scroll discharge mechanism.

Two 35' dia. Dorr Thickeners are each designed to handle 50,000 lbs/hour of 50% caustic solution containing salt crystals in suspension. Thickened underflow, consists of caustic solution and salt, averages 60% solids. Overflow is strong caustic, essentially free of solids.

For complete information on all types of sedimentation, clarification, separation or classification equipment, write to Dorr-Oliver Incorporated, Stamford, Connecticut.

DORR-OLIVER
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

Check 1143 opposite last page.



WITH IECO package type

PLANTS

Now a choice of Liquid or High Pressure Oxygen and Nitrogen Gas, with a minimum time required to reach production temperatures, plus simultaneous production of both gases, which increases production of up to 60% over producing oxygen alone, with a corresponding reduction in operating costs.

The newly designed plants are a combination of the best features of the earlier two-product plants, with the latest concepts of external refrigeration. Type illustrated in sizes from 1500 through 5500 C.F.M. oxygen capacities. Tonnage Oxygen-Nitrogen Plants that produce Argon are also available.

Independent's experienced engineering staff invites the opportunity to assist you in the selection of the proper model and size plant that will fit your individual needs as a user and/or distributor.

SEND YOUR INQUIRIES TODAY TO

INDEPENDENT ENGINEERING CO., INC.
O'FALLON 8, ILLINOIS

Check 1144 opposite last page.

process to separate the Y^{90} not only from calcium but from non-radioactive natural strontium also present in such samples. This analytical method could be up to 10,000 times more sensitive than older methods in certain cases.

Since much of the volume of waste material in fission products from spent reactor fuels is associated with removal of Sr^{90}, the Argonne-developed extraction method could reduce considerably the amount of waste to be disposed, simplifying the handling process and lowering the costs.

The process could also be used to isolate Sr^{90} in pure form from spent nuclear fuel, making this important isotope available for research or industrial use.

The process utilizes liquid to liquid extraction techniques involving acidic phosphate, phosphonate esters and organic phosphonic acids as extractants.

(Strontium-90 extraction process was described in paper presented before 138th national meeting of the American Chemical Society in New York City.)

Non-radioactive system for nuclear safety training proposed

Phosphor, UV light source duplicate procedures

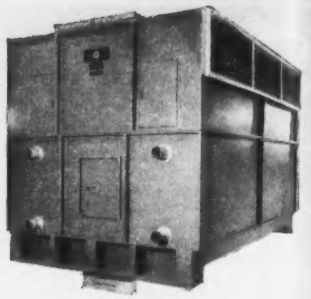
The perplexing problem of training personnel in safe procedures for radioactivity detection and decontamination is target of a contract recently awarded by the U. S. Navy Training Devices Center.

Radioactivity, being tasteless, colorless, and odorless can only be detected through the use of sensitive geiger counters. Conventional training procedures involve use of portable geiger detectors to ferret out radioactive "hot spots" and subsequently decontaminate these spots.

The contract is based on a system suggested by the successful contractor. This system employs three basic ingredients: a "phosphor" which emits

This Self-Contained Fluid Cooling System

. . . gives most accurate temperature control



Applied in cooling industrial machines or processes to temperatures approaching the ambient wet-bulb, the NIAGARA *Aero* HEAT EXCHANGER is independent of any more than a nominal water supply or disposal. The coolant system is a closed one, free from dirt and maintenance troubles.

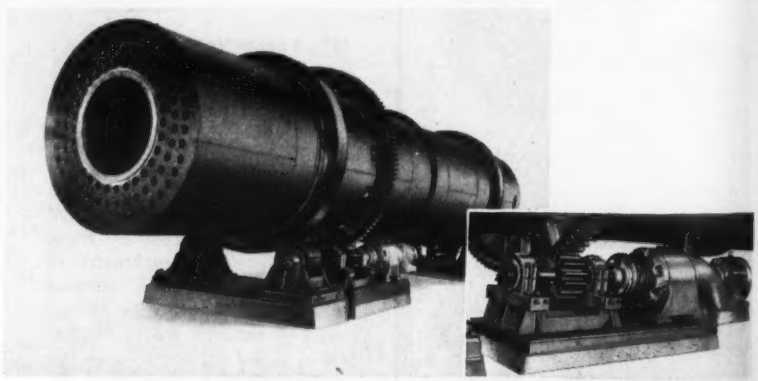
Heat is removed from your process *at the rate of input,* giving you precisely the temperature you require and assuring the quality of your product. Heat may be added to prevent freezing in winter or for better control in a warm-up period. Liquids or gases are cooled with equal effectiveness.

Heat is rejected outdoors. Only the little water evaporated on the cooling coils in the air stream, or discharged to prevent hardness build-up, is consumed.

Niagara sectional construction saves you much installation and upkeep expense, gives full access to all interior parts and piping. Your equipment always gives you full capacity and "new plant" efficiency.

Write for Niagara Bulletin No. 132 for complete information

NIAGARA BLOWER COMPANY
Dept. CP-11, 405 Lexington Ave., New York 17, N.Y.
District Engineers in Principal Cities of U. S. and Canada
Check 1145 opposite last page.



"DAVENPORT" Rotary Steam Tube Dryer 8'-0" x 45'-0"

This dryer will dry soybean meal in a large midwestern soybean plant.

Let our engineers consult with you on your Pressing, Drying and Cooling problems or send for our catalog C. For quick reference consult your Chemical Engineering Catalog.

DAVENPORT MACHINE AND Foundry Company
DAVENPORT IOWA, U. S. A.

DAVENPORT
PRESSING — DRYING and COOLING Equipment
Continuous DeWatering Presses
ROTARY DRYERS
Steam Tube, Hot Air and Direct Fire
Atmospheric DRUM DRYERS
ROTARY COOLERS
Water and Air

Check 1146 opposite last page.

light when exposed to certain types of energy, an ultraviolet light source to excite the phosphor, and a photomultiplier tube.

The "phosphor" is an inexpensive, non-toxic chemical compound which can be used as solid, liquid or powder, typical forms in which actual radioactive materials might appear. As an added advantage it is susceptible to routine decontamination procedures used in nuclear "clean-ups".

(Nuclear Safety Training Procedure is being developed by Tracerlab, 1601 Trapelo Road, Waltham 54, Mass.)

Check 1147 opposite last page.

NEW LITERATURE

Ideas and New Trends

History of calcium carbide and its derivative, acetylene, is told in 16-page brochure which includes description of manufacturing process. Calcium Carbide Bul—National Carbide Company, division of Air Reduction Co., Inc.

Check 1148 opposite last page.

Waste disposal by means of a unique unit which provides complete sewage treatment in single tank is described in eight-page booklet. System can dispose of waste of 150 persons (15,000 gpd). Bul 7315—Dorr-Oliver, Inc.

Check 1149 opposite last page.

Facilities for manufacturing high-pressure steel vessels and custom fabrication of tank and bulk-handling trailers for liquid and dry bulk materials are in Trinity Bul—Trinity Steel Company, Inc.

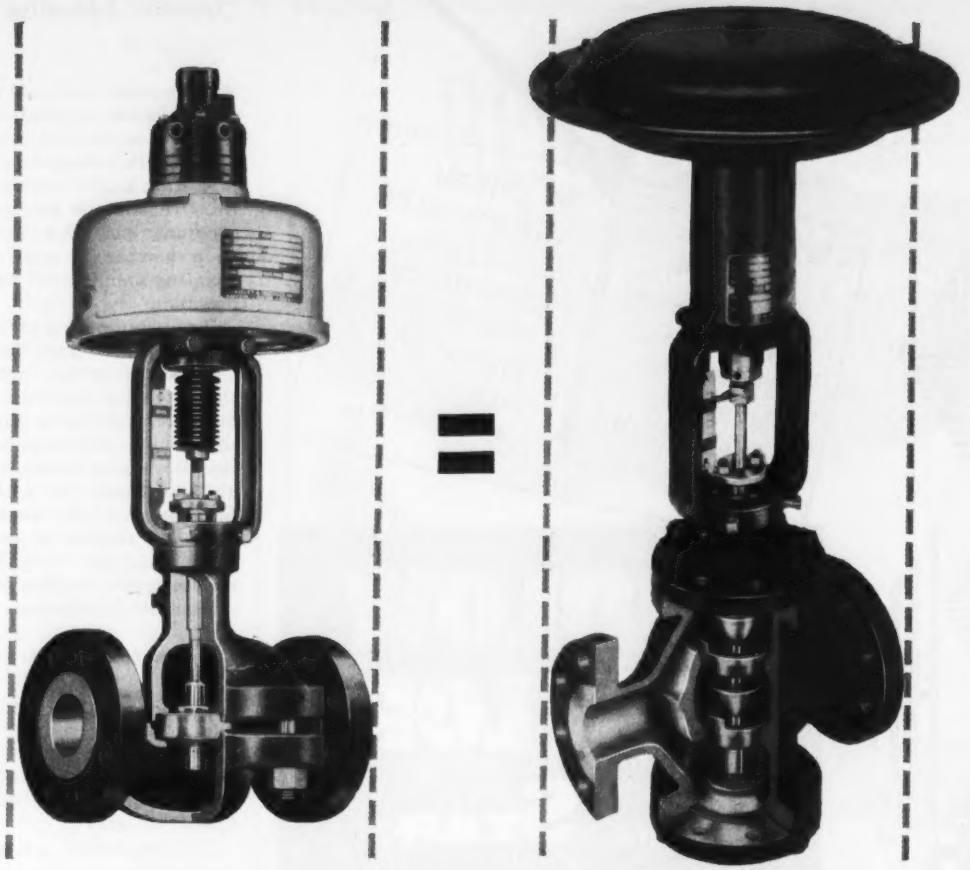
Check 1150 opposite last page.

Radioactive compounds, including 69 new carbon-14, 17 new tritium and 16 new short-lived isotope-labeled compounds, are presented with prices in Radioactive Compound Price List—New England Nuclear Corp.

Check 1151 opposite last page.

Ideas for cutting costs and solving air pollution problems through use of mist eliminators in the pulp and paper industry are presented in Cost Saving Ideas Bul—Metal Textile Corporation, division of General Cable Corporation.

Check 1152 opposite last page.



"FIT" Companions

reduce costs . . . increase valving flexibility

With face-to-face dimensions to I.S.A. standards, K&M split body valves are interchangeable with K&M regular globe-body diaphragm valves (and with all standard makes of diaphragm valves).

This *exclusive* feature of the K&M split body design enables you to make significant reduction in your plant inventory investment of replacement valves. It gives you highly desirable flexibility.

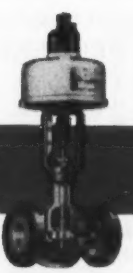
Additional flexibility is provided in the K&M split body valve itself. Interchangeable, unitized construction makes it possible to develop 432 different valve combinations from a single split body.

In a matter of minutes you can make the body reverse or direct-acting; switch the operator to dome, diaphragm, or handwheel; change the seat ring to one of several types; recharacterize by selecting a different plug; substitute the replaceable, rotatable flanges; convert from globe to angle type.

The K&M split body valve fits your existing piping and fits your budget.

One more plus . . . K&M split body valves have the largest C_V offered in split body construction . . . more flow for your money.

Write for Catalog 132 completely describing the valve that brings the split body idea to its fullest development.



K&M

diaphragm control valves

Our 79th Year

KIELEY & MUELLER, INCORPORATED

Oldest Pressure and Level Control Valve Manufacturer

64 Genung Street, Middletown, New York

S.A. 1697

Check 1153 opposite last page.

Whatever the operation—whatever the results you want—Ludlow-Saylor and Star can deliver the finest woven wire screen or cloth from stock, or precision weave it promptly to your most exacting specifications.

More than a century of technical know-how and the industry's most complete facilities are at your service. *Write for NEW CATALOG 105* that shows hundreds of weaves, meshes and metals ready for IMMEDIATE DELIVERY.

L-S and Star Cloth and Screens are woven from stainless steel, Monel, bronze, copper, brass, high carbon and oil-tempered steel, and virtually any metal that can be drawn into wire.

LUDLOW-SAYLOR WIRE CLOTH COMPANY
4333 WEST CLAYTON AVENUE • ST. LOUIS 10, MO.
Birmingham 512 No. 18th St. • Chicago 6261 West Grand Ave. • Denver 1530 Carr St.
Houston 5630 Harvey Wilson Dr. • Pittsburgh Union Trust Bldg.

STAR WIRE SCREEN AND IRON WORKS, INC.
(L-S SUBSIDIARY) LOS ANGELES, 2515 SAN FERNANDO RD.

Check 1155 opposite last page.

Operator Education

From page 48

ical operators and lab technicians have completed the 11-week series. Several have gone on to begin college-level work in night school. Because of this tremendous interest, the program has been instituted as a permanent part of the company's industrial-relations program.

Production chemists working with graduates feel that their knowing the "why's" of their jobs has resulted in better work attitudes and improved job performances. The operators have shown a greater willingness to seek help because they now realize the technical nature of many of their problems. They have a clearer understanding of pharmaceutical production.

Results Constantly Evaluated

Three months after the employee has completed the course, a questionnaire (that does not have to be signed) is given him to be filled-out. Questions asked:

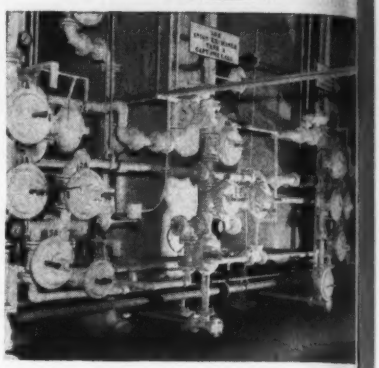
1) How would you rate the material in the course?
2) How would you rate the way it was presented by the lecturers?
3) How do you rate the manual?
4) Do you refer to the manual?
5) List some of the plant problems that you feel the course and manual helped you understand or solve. Example: I called the chemist's attention to ————. Now it works better.

Information gleaned from answers thus obtained keep the program from becoming stultified and make it reflective of changing student needs and abilities. Also, chemists and chemical engineers attend some sessions from time to time to evaluate it.

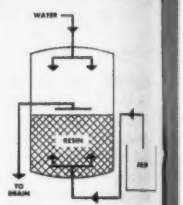
Two comments received from students after completing the course reflect the impact the classes have had: "How would it be if there was a meeting once or twice a year for chemical operators about accidents which have happened in the plant?" "It (the course) helped me to understand management a little better." Multiply such

HIRAM WALKER uses...

ILLCO-WAY ionXchange



Right, a diagram of the IWT Counterflow* system of regeneration, whereby a downward flow produces a "barrier" to keep the bed from being expanded by the upward flow of regenerant.



DISSOLVED SOLIDS IN RAW WATER REDUCED FROM 570 TO 3 PPM USING "COUNTERFLOW"

At the Hiram Walker distillery in Peoria, Illinois, the IWT equipment shown above is used to provide purified water for adjusting proof of various alcoholic beverages. It consists of *automatic* Counterflow* cation exchangers, automatic weakly-basic anion exchangers, and a vacuum degasifier. The de-ionized water is suitable for beverage use *without any need for activated carbon filtration*, because the resins used do not add any taste, color, or odor to the water. The equipment, after 2½ years, is still giving rated capacity of 140,000 gallons in each 24 hours. Quality, proposed at 5 ppm, actually runs mostly at 1 ppm with a maximum of 3 ppm. Counterflow* regeneration provides lowest operating cost through reduced regenerant dosages.

* U.S. Pat. 2,891,007

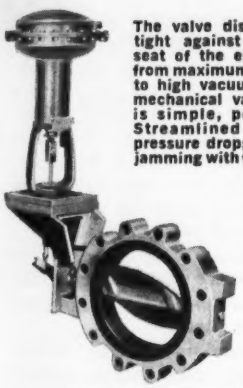
IWT LEADS THE WAY

The experience which enabled IWT to produce this excellent performance at Hiram Walker has been gained through intensive pioneering in the important phases of the ion-exchange process ever since its introduction in 1937.

ILLINOIS WATER TREATMENT CO.
840 CEDAR ST., ROCKFORD, ILLINOIS
NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.

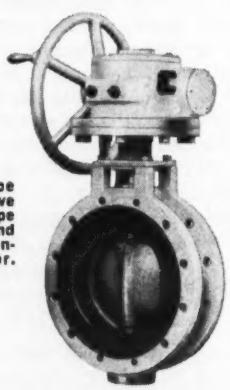
Check 1156 opposite last page.

TIGHT CLOSURE is NO PROBLEM with ROCKWELL BUTTERFLY VALVES



The valve disc seats drop-tight against the resilient seat of the elastomer liner from maximum line pressure to high vacuum. Manual or mechanical valve operation is simple, positive, fast. Streamlined design; low pressure drop; no fouling or jamming with foreign matter.

Wafer type butterfly valve with spool type rubber liner, available in "Keelok" snap-in, easily replaceable type or vulcanized to body. Shown with pneumatic operator. Bulletin 583.



Flanged type butterfly valve with spool type rubber liner and worm gear manual operator. Bulletin 582.

W. S. ROCKWELL CO.

2200 Eliot St., Fairfield, Conn.

Check 1157 opposite last page.

idea stimulation and attitude modification by 500, and one begins to understand the value of this course to the company.

Of course Hoffmann-La Roche is not the only organization in the CPI doing a first-rate task of pride-in-work and job-interest stimulation. Their program of education does, however, serve as an excellent example of the type of thing that can be done by the forward-looking company.

The attitude of complete indifference which is threatening to erode away the foundations of our economic success cannot be eradicated by negative supervisory attitudes on the one hand . . . or by pleasant, meaningless gestures of management friendship on the other. The only thing that will remove it is stimulation of a positive worker attitude of job interest, pride and understanding. This is the big lesson to be learned from Hoffmann-La Roche's successful experiment. ■

Nuclear waste disposal costs reduced 75% by incinerator

Permits use of paper clothes at $10,000/yr savings

A special incinerator is expected to reduce by 75% the cost of disposing of contaminated wastes from General Electric Atomic Power Equipment Department's fuel manufacturing operation at San Jose, Cailf.

Such wastes normally are encased in concrete containers and dumped in special burial grounds, an expensive operation.

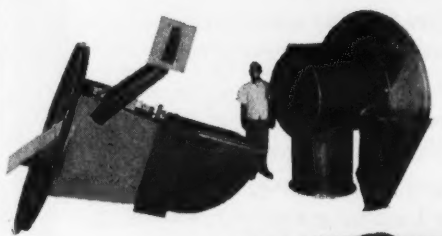
Major hurdle in constructing the incinerator was finding a furnace unit which burned hot enough so that carbon did not clog the filter unit, but which was not so hot that it burned out the radioactive particle filters.

Spray Solves Problem

The problem was solved with a water spray unit which cools rising gases so they can

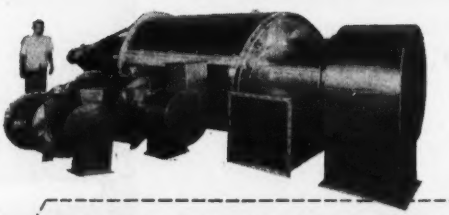
EDW. RENNEBURG & SONS CO.

fabricates Chemical Processing Equipment in ALUMINUM and other alloys



All-Aluminum Dryers, Coolers and Cyclonic Separators (wet and dry types) for processing Urea Crystals and Prills.

Literature and information on request



EDW. RENNEBURG & SONS CO.

2639 BOSTON STREET, BALTIMORE 24, MD.

Serving the Process Industries for over 85 years

Renneburg Research & Development Center—2635 Boston St., Baltimore 24, Md.

Check 1158 opposite last page.

be filtered without damaging the filter. The incinerator consists of a high-temp furnace box which completely burns all combustible material; spray cooling equipment; and absolute filtration system — designed to stop even bacteria — which traps all radioactive particles in the exhaust gases.

Waste material is ejected into the furnace box from an air-lock receiving chamber. As it is burned, a powerful fan sucks the gases up through the filter.

A water level indicator is used to monitor the quantity of material trapped by the filter. Filters are generally changed when 3 to 4 lb of dirt particles have been trapped.

Burns 100 lb/hr

The incinerator is designed to burn 100 lb (about 30 cu ft /hr. If handled by an atomic waste disposal firm, this would cost over $160 ($5.50/ cu ft). Ashes from the material—about 1/10 of the original volume — and filters can be turned over for disposal at a fraction of that cost.

Although disposal costs are cut 90% or more, overall savings are about 75% due to operating costs.

Wastes now being burned in the incinerator include wiping material, paper which covers work areas, boxes and paper workclothing, the latter representing a $10,000/yr saving.

The suits, made of fire- and water-resistant nylon-threaded paper, cost 99c each and are worn once or twice before being burned. This is less than the cost of having normal work clothing decontaminated in a special atomic laundry.

(Nuclear Waste Incinerator was designed by Atomic Power Equipment Department, General Electric, Schenectady 5, N. Y.)

Check 1235 opposite last page.

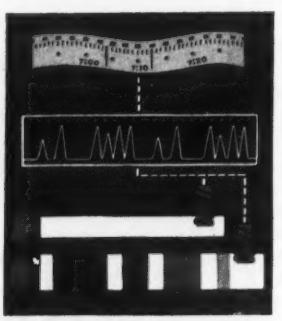
For more information on developments in this section, check the Reader Service Slip.

to achieve greater accuracy and flexibility in process stream analysis . . . MSA brings tape programming to Gas Chromatography

A tape-programmed control unit is the key to improved accuracy and flexibility in MSA's new Gas Chromatograph. It's the first of its kind to be used for this purpose. System consists of a motor-driven transparent film in conjunction with a photoelectric transmitter and receiver to provide any combination of time and sequence required.

The tape is a single continuous loop of standard 16-mm film. It's printed in 1-second graduations. Setting up a program is simple: just mark the tape with a lead pencil at appropriate intervals. Repeatability is to within 1/10 of a second.

Here are some other features of the new M-S-A® Gas Chromatograph: analyzer temperature is controlled to within .03°F; a three position function switch permits rapid change from bar graph to spectrum presentation or manual operation; and the analyzer unit can accommodate two columns each up to 50 feet in length.



Write for new tell-all bulletin on this new chromatograph.

INSTRUMENT DIVISION
Mine Safety Appliances Company
Pittsburgh 8, Pennsylvania

MSA

MSA backs up its label with selection, quality, research, experience

Check 1159 opposite last page.

Five 2000-gpm salt-water pumps, including three shown here, are automatically operated to regulate pressure in process-coolant lines. Each pump is driven by a 125-hp electric motor. Pump house appears in background

In some plants, an always-ready process-coolant supply is taken for granted . . . that is until something goes wrong. Happily, there are many exceptions to this type of thinking. One recent case in point is that of Chas. Pfizer & Co., Inc. When it became apparent to them that rapidly expanding production facilities would soon outstrip capabilities of their saline-water-coolant distribution system, they immediately took an "ounce of prevention" attitude and set about to design a new system. The result (related by an engineer close to the project):

Coolant flows without a hitch in automatic distribution system

WILLIAM L. NASH
Electrical Engineer
Chas. Pfizer & Co., Inc.

A flexible, expandable and relatively inexpensive automatic saline-water-coolant distribution system, designed to meet both present and future needs, has recently been installed at the Groton, Connecticut, plant of Chas. Pfizer & Co., Inc. As has been the case in the past, the new setup utilizes salt water from the mouth of the Thames River. The project was conceived and initiated as a result of continuing growth of both pharmaceutical and fine-chemical manufacturing facilities at Pfizer.

Basic elements of the installation are shown in drawing. In operation, system includes two indicating pressure transmitters. The first is located at a critical supply point near end of distribution line, second near the large pumps in the pump house.

Two recording and controlling receivers are located in the power house. They continuously chart telemetered pressure signals. At operator's convenience, either receiver unit may be placed in charge of system. This provision insures uninterrupted automatic control during periodic instrument or system maintenance, during chart replacement, and in event of failure in transmission circuit from either transmitter.

Careful Planning Precedes Project

Expansion of the existing pressure-control system was rejected in preliminary planning conferences. Line pressure had been controlled by water level in elevated head tank. Pumps were controlled by a float system to maintain required level. Construction of a new head tank sufficient to meet current and expected demand loads would have consumed considerable capital expenditure without adequately improving reliability or stability.

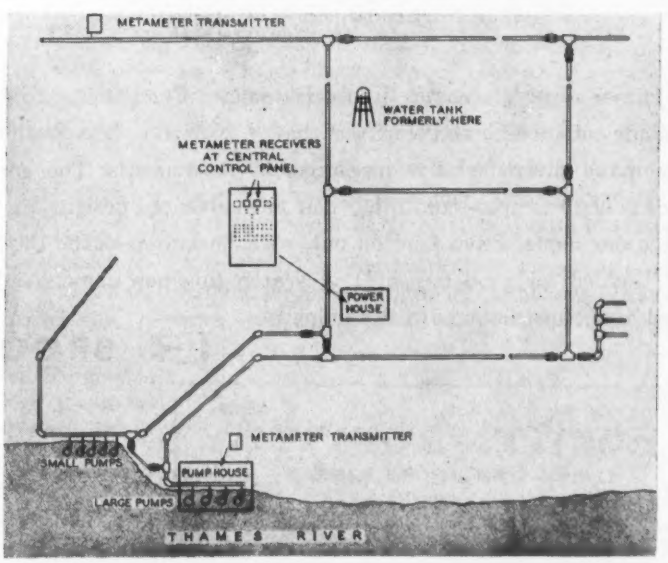
Thus a new system was decided upon. It was agreed that it should incorporate 1) automatic regulation of line pressure within permissible limits during normal operation, 2) provision for rapid changeover to emergency control in event of abnormal demands or breakdown of pump or control-system components and 3) economy of installation and operation.

In setting up the system, a basic impulse-duration type telemetering system was first chosen to record and control line pressures at critical supply points in distribution network.

Four 10,000-gpm salt-water

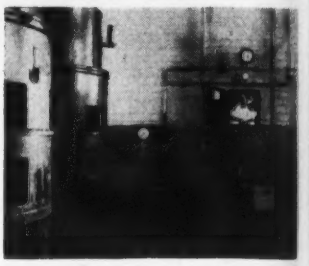
To next page

Saline-water-coolant Distribution System



pumps plus five smaller units, each of 2000-gpm capacity, provided a total capacity of 50,000 gpm. Since total coolant requirement of the system consisted of a large number of loads of small or moderate individual demands, normal fluctuations were not expected to exceed 20% of total capacity.

Control-design premise was to provide constant base flow into distribution system from large pumps and stabilizing



Four 10,000-gpm pumps located in pump house maintain base-line flow. Transmitter at right indicates line pressure at output side of pumps

line pressure through automatic control of five small pumps.

Alarm contacts were added to controller specifications. In this manner, during periods of unusually large demand changes, visible and audible high- and low-pressure signals at the power house and an audible alarm at pump house would be activated.

Personnel would then be alerted that stabilizing capacity of the automatically controlled pumps had been exceeded. Manual starting or stopping of one or more large pumps (as required) could then restore system near enough to equilibrium to permit automatic control to restore line pressure to within set range.

Emergency control features were incorporated in the design with inclusion of high- and low-point alarm contacts in receiver-controller units, provision for pushbutton shifting of automatic control from one unit to an alternate, and by permitting overriding manual control of any or all pumps from either the pump room or power house.

IF IT DOESN'T FIT

WHY WEAR IT?

Our former corporate name, Brooks Rotameter Company, used to be adequately descriptive of us. We made, rotameters, and that was that. • Now the shoe doesn't fit so well any more. For now we make many diversified flow-measurement instruments. The unique MagPnuTraX™ Flow Transmitter is one example—and other new and advanced designs are on the way. • So we've decided to change our name. From here on out, we'll be known as the Brooks Instrument Company (with an "Inc." added for good measure). • Watch this new name. You'll be seeing it on some of the most talked about instruments in the industry.

BROOKS INSTRUMENT COMPANY, INC. HATFIELD, PENNSYLVANIA

Check 1160 opposite last page.

Basic design parameters permitted application of an inexpensive control network. Telemetering system selected is a standard design of the instrument manufacturer. In achieving markedly increased capacity, only one additional salt-water pump was required. Since design required no capacitative head tank, the existing tank was made available to other plant applications.

Maintenance Is Major Design Factor

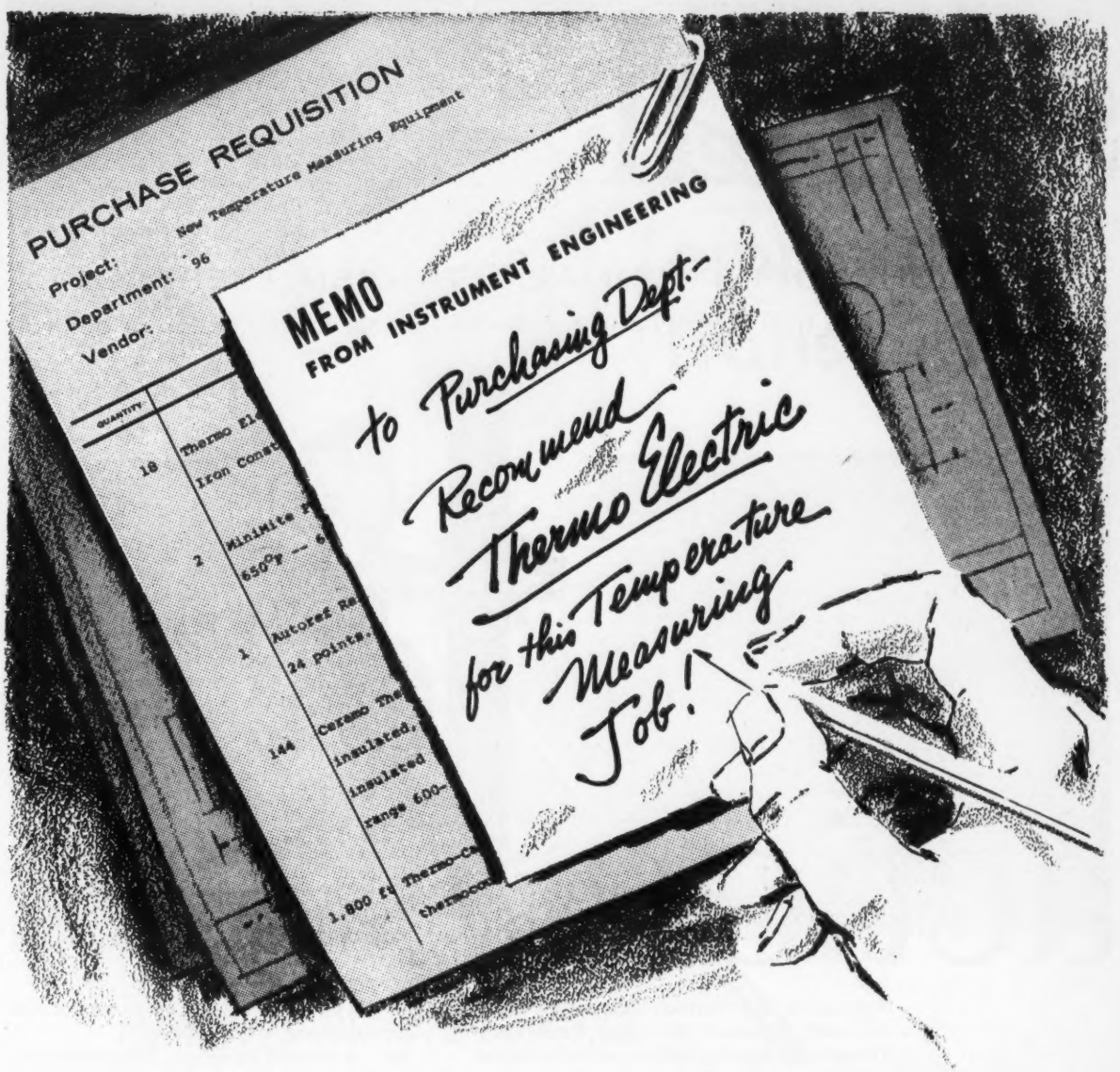
Because of maintenance considerations, the total number of pump starts were minimized. Also, starts required were spread evenly among the operational pumps. Finally, extended application of starting voltage to an inoperative pump was eliminated.

Elimination of unnecessary pump starts required that pump-motor actuating circuits be responsive only to sustained deviations of measured pressure from set point. Incorporation of a 30-sec time delay through control-circuit relays insured that spurious pressure fluctuations would not energize pump primers.

A tendency to burden one or two of a battery of pumps with the major start-and-stop load has been a weakness of many multiple-pump pressure-regulating systems, whether manually or automatically controlled. This obstacle was avoided with application of continuous stepping switches to sequentially start and stop pumps.

To further safeguard individual pumps against unnecessarily frequent starting, circuit design also included a pulse counter in wiring to each pump. Counter totalizes number of starts by that pump. If it reaches four starts before being reset by a one-hour timer, primer circuit to pump is locked out until reset — either manually or automatically by the timer. Accordingly, no pump will be started more than four times in one hour without the operator's knowledge.

Time-delay relays were also placed in the design to elimi-



Every industry has its pacemakers, who, through superior engineering know-how and application, build a reputation for unexcelled product quality and customer service. Today, Thermo Electric Co., Inc. is setting the pace, and has the reputation for high quality standards in temperature measurement equipment.

Why Should You Insist on Thermo Electric Quality Temperature Measuring Equipment?

— Because every piece of Thermo Electric equipment is guaranteed to give you sensitivity, fast response with consistent accuracy over a longer useful life. In all system components—indicating, recording, controlling instruments, monitors, wire, connectors, thermocouples, etc.—Thermo Electric maintains high manufacturing and quality standards. Basic materials and parts are subjected to intensive field and laboratory testing before being selected for use in Thermo Electric products. Even in packaging, there is no compromise with quality, since that one departure could nullify all previous controls. This emphasis on quality pays dividends to you! They are—improvements in your product or service quality level, fewer rejects, lower manufacturing costs, lower maintenance and replacement costs.

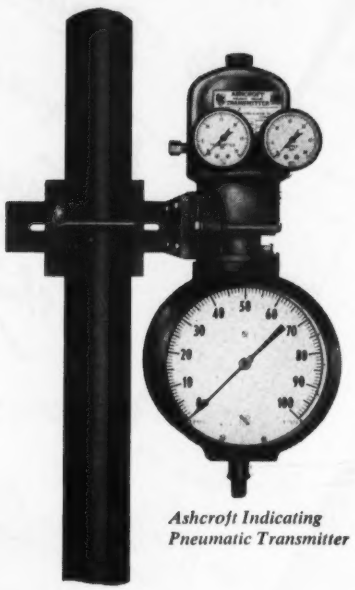
In addition, all Thermo Electric's energies and engineering skills are devoted to one cause—dependable, long-lived accuracy in all temperature control products.

When next you need temperature measuring equipment designed for higher performance standards—greater capacities—you can, with confidence—use Thermo Electric.

Thermo Electric CO., INC.
SADDLE BROOK, NEW JERSEY
In Canada: THERMO ELECTRIC (Canada) LTD., Brampton, Ontario

signal action

ASHCROFT PNEUMATIC TRANSMITTERS give you a true primary and transmitted signal for indication or control



Ashcroft Indicating Pneumatic Transmitter

Now—detect with precision accuracy the slightest change in primary pressure or temperature. Transmit this signal quickly to your indicators or controllers. Ashcroft Pneumatic Transmitters achieve these results for you at the lowest initial and operating costs.

Full-range, solid-front indicating and totally accessible nonindicating transmitters eliminate the need for costly high pressure lines, yet permit complete monitoring of process conditions in remote areas.

Narrow-span Ashcroft Transmitters are expressly designed with highest sensitivity and repeatability for the most accurate primary signal feed to controllers. You get better control and purer, lower-cost final products.

Only in Ashcroft Pneumatic Transmitters can you get the wide choice of Ashcroft Duragauge Bourdon tubes or American mercury or gas-actuated systems for sensing pressure or temperature conditions. You also get a time-proven, obstruction-proof, force-balance, nonbleed relay for economical, maintenance-free 3-15 psi or 3-27 psi signal transmission.

Write for factful Bulletins 360 and 361 or ask your nearby Ashcroft Distributor to help you select the right transmitters and receiver gauges for your specific requirements.

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

ASHCROFT PNEUMATIC TRANSMITTERS

A product of

MANNING, MAXWELL & MOORE, INC.

Gauge and Instrument Division • Stratford, Connecticut

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Check 1161 opposite last page.

nate danger of equipment damage due to continuous application of starting voltage to starter circuit of a pump which refuses to turn over. If no response is sensed (after sufficient time is allowed for pump to come up to operational speed), AC relays are energized to open the circuit. The pump will then be stepped over in starting sequence until restored by manual reset.

Manual lock-out was provided through stop button which opens motor starter circuit. Until reset, pump remains in locked-out status — allowing uninterrupted automatic control of the remaining pumps while one or more are removed from battery for maintenance.

In anticipation of continued plant growth and an accompanying increase in coolant demand, Bristol's application engineers presented an expandable design, permitting addition of transmitters in line and of recorder-controllers at control panel.

(Metameter® telemetering system is product of The Bristol Company, Waterbury 20, Conn.)

Check 1162 opposite last page.

Automatic-control systems slated to take spotlight at the Power Show

Closed loop is the goal of many new products

Automatic intelligence systems for regulating over-all performance of power plants will be among developments to be exhibited for first time at this year's National Exposition of Power and Mechanical Engineering. This 24th biennial Power Show is to be held at the New York Coliseum Nov. 28 to Dec. 2.

The exposition will feature a variety of new equipment for tying power-plant units into unbroken stream line to convey energy from fuel through combustion and heating processes to connected power load. These control systems are designed to take the

pulse of operating units, analyze individual operations and regulate controls to secure optimum economy in over-all power-plant operation.

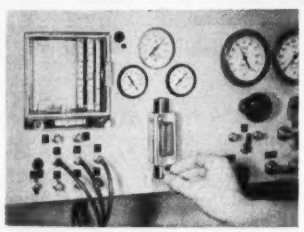
The latest in process instrumentation for combustion control, flue-gas analysis, boiler-water analysis, pH indication and control and feed-water will be on display.

Further information concerning the show may be obtained from International Exposition Company, 480 Lexington Ave., New York 17, New York.

Small snap-in flowmeter handles low rates

A miniature flowmeter has been specifically designed for measurement of low flow rates of either liquids or gases. Tube of unit is of snap-in type. This permits change in range in few sec without use of tools.

In operation, tube floats between end fittings on O-ring seals. It is free from pipe vibrations and misalignment stresses. End fittings can be rotated through full 360°. Flowmeter is available with 1½ or 4" scales, with or without integral needle valve and with option of brass or stainless-steel end fittings.



Flowmeter is of snap-in type, permitting change in range in few sec without use of tools

(Minirator flowmeter is product of Fischer & Porter Co., 551 Jacksonville Rd., Warminster, Pa.)

Check 1163 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

Rugged, Sensitive Temperature Transmitter

Measuring Spans
of 50°, 100°, 200°, 300°, and 400° F, are easily set as required within over-all transmitter range of —100° F to +1000° F.

Stable Operation
Single lever, single pivot, force-balance system provides stable, friction-free operation.

Fast Response
Highly sensitive, low-volume, gas-filled bulb and minimum length capillary assure maximum speed of response.

High Accuracy
Full compensation for ambient temperatures and pressures helps maintain highest calibrated accuracy.

Low Cost Installation
Standard 3-15 psi output signal requires only low cost tubing for transmission to any recorder or controller.

. . . IMPROVES REMOTE CONTROL

There's no easier, simpler way to measure remote temperatures, over so wide a range, with such high sustained accuracy and speed, and at so low a cost!

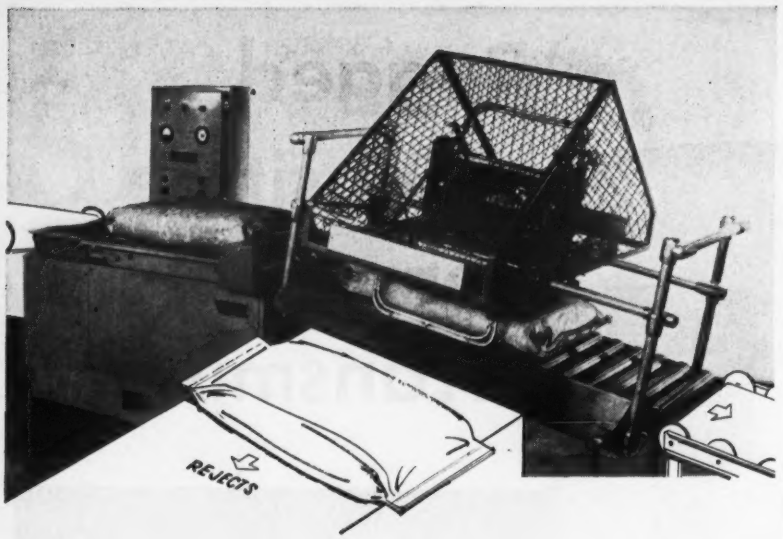
The Foxboro Type 12A Pneumatic Temperature Transmitter converts temperature measurement to a linear output signal, which is transmitted to any standard 3-15 psi recorder or controller. Fully compensated for ambient temperatures and pressures, this rugged, highly responsive instrument performs outstandingly under the most severe conditions. And it's insensitive to mechanical vibration.

The transmitter weighs only 7 pounds with its integral mounting bracket. It can be mounted anywhere . . . in any position . . . even directly on a bulb well! The gasketed, weatherproof housing permits installation in any location.

Write for Bulletin 13-17. It explains fully why the Type 12A Temperature Transmitter gives better performance with lower installation and maintenance. **The Foxboro Company, 8111 Norfolk Street, Foxboro, Mass., U.S.A.**

FOXBORO
REG U.S. PAT. OFF.
Pneumatic Temperature Transmission

Check 1164 opposite last page.



SELECTROL® checkweighs bags with 1/10 of 1% accuracy

...with rate of speed at twenty 50-pound bags per minute...

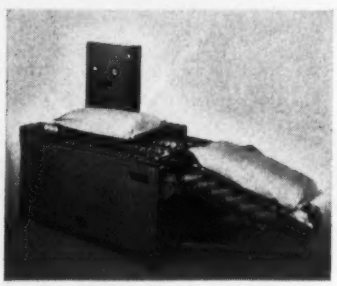
Model 1250 Selectrol, designed for installation in a production line, checkweighs bags from 25 to 150 pounds in motion... and detects weight variations as small as 1½ ounces or less per 100 pounds. Speed is variable — up to 25 bags per minute, depending on size and weight. Tolerance is adjustable to your requirements.

The Selectrol shown above has automatic overweight and underweight rejection mechanism. Models are available with underweight rejection only or without rejection mechanism. All electrical parts are fully protected against dust and oil.

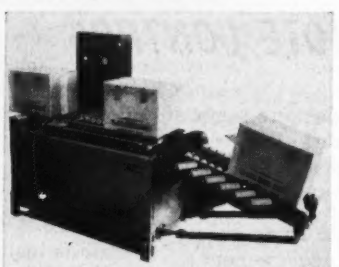
Optional equipment includes: recorders, counters, visual and audible signaling devices and special control accessories to your requirements.

Selectrols are made by Exact Weight, a leading manufacturer of job-engineered scales for 45 years with experience gained through hundreds of checkweighing installations.

WRITE FOR BULLETIN 3376



Selectrol Bag Checkweigher shown above without rejector mechanism



Selectrol Case and Carton Checkweigher with rejector mechanism. Acceptable weights continue in a straight line; over and under weight cartons are diverted off the line.

Exact Weight SCALES

THE EXACT WEIGHT SCALE CO.
905 W. FIFTH AVE., COLUMBUS 8, OHIO
In Canada: 5 Six Points Road, Toronto 18, Ont.

Find us in your local 'Yellow Pages'

Sales and Service Coast to Coast

BETTER QUALITY CONTROL . . . BETTER COST CONTROL

Check 1165 opposite last page.

QUALITY CONTROL is almost universally a thorn — albeit a necessary one — in the side of a batch processor. The time delays involved are costly and a constant source of irritation to production people. This is one corner that cannot be cut, however. Close adherence to prescribed standards is always essential — and doubly so for the smaller processor who must sell "quality of product" to successfully compete against the larger concerns. Reduction of the time needed for adequate analysis is the only way of approaching the problem. In the case described here, a relatively inexpensive infrared moisture balance has turned just such a trick.

Solids-determination time trimmed by two-thirds

Switch from oven to IR sample drying opens quality-control production bottleneck to give two-batch/day bonus

EDWARD CRUMBACK JR.
Quality Control Chemist
Williamson Adhesives, Inc.
Skokie, Ill.

Keeping production personnel and equipment idle for 1 to 1½ hours after each batch run is an expensive proposition. Yet this costly delay — caused by quality-controlling every one of our batches of solvent-borne adhesives — was a necessary one until recently for Williamson Adhesives, Inc. The control analyses consisted of oven-drying and weighing batch samples to determine solids contents.

While unpleasant for everyone concerned, such testing is absolutely necessary to success of our operations. Williamson produces pressure-sensitive solvent-borne adhesives to customers' specifications . . . as well as a variety of other products. These include an epoxy repair material sold under the brand name of Plastic Mastic Base and Hardener.

We are required to meet a variety of specifications in production of our adhesives. Solids content of each of these is the critical parameter. It directly affects the applied-coating quality. Coating yardage is lost if solids content is too high, and vice versa.

In the past we used the oven-drying and weighing technique for determining solids contents of batch samples. Our average test time was over 1½ hours. Today, we are running the same tests with at least the same accuracy in 20-25 minutes — a saving of over an hour of idle production time on every batch. This means we can now run two or more batches per day than was previously possible.

The IR moisture balance is easy to use. After sample is loaded, heater and timer are set. From that point on, unit operates automatically to complete test. At end of cycle, instrument records % of solids in sample on digital counter

Secret of Success Is IR Moisture Balance

What has made all this possible? Our secret weapon is a relatively inexpensive far-infrared moisture balance. It can be set to directly indicate % of readings of either moisture or solids content. (In our case, the solids-content reading was preferred.)

The balance is easy to operate. After a sample is loaded in the pan, the heater and timer are set. From that point on, the unit operates automatically to complete test. At cycle's end, instrument records sample solids % on a digital counter.

Speed Is Not Only Advantage

In addition to paring so much time from our testing operations, the IR unit has proved to be a real asset in other respects. Its automatic cycle requires no attention until completion. All sample handling is eliminated after initial pan loading.

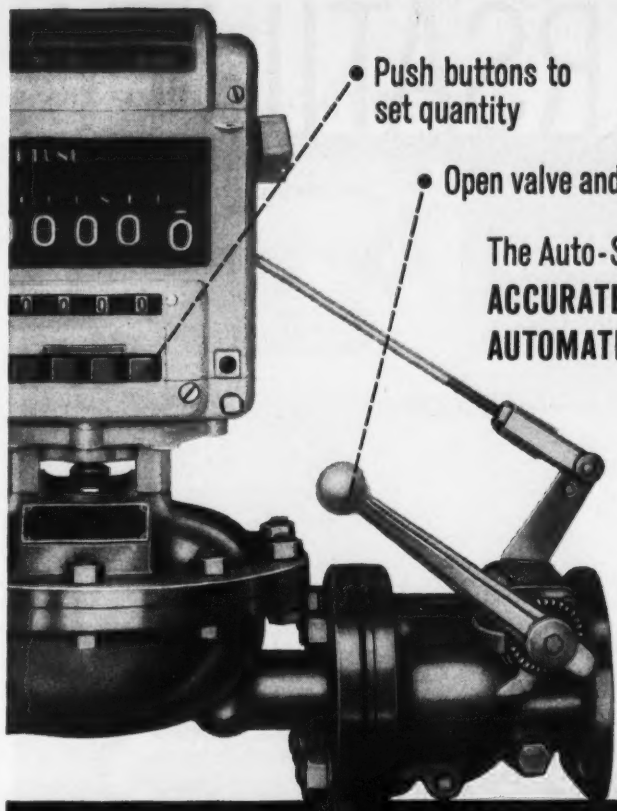
Far-infrared heating is the best drying technique we have seen. It penetrates to all sample levels to an almost equal degree. In this manner, surface caking of sample and extraneous physical or chemical actions do not occur . . . to either prolong test or add unknown variables to it.

To check-out moisture-balance accuracy we compared its performance against a closely controlled oven-drying test. Results: the IR unit had a reproducible accuracy of 0.1% This is at least equivalent to the accuracy obtained with oven-drying methods in the average industrial lab.

The IR instrument is totally enclosed. Therefore, by utilization of a simple exhaust hood we can keep all fumes out of the lab at all times — a feat that can sometimes be tough to accomplish with standard laboratory ovens.

(I-R Moisture-Matic balance is product of Moore-Milford Corporation, 8034 Central Park Ave., Skokie, Illinois.)

Check 1166 opposite last page.



NEW...STAINLESS STEEL AUTO-STOP LIQUID METER

It's here! *Automatic formula control* for the batching of corrosive liquids or liquids that must be kept free from contamination! It's the new Neptune Stainless Steel meter with all-stainless, Auto-Stop valve. The register watches the delivery, automatically trips the valve shut at the exact quantity. Valve is mechanically coupled...no inaccuracies due to time-lag in cut-off.

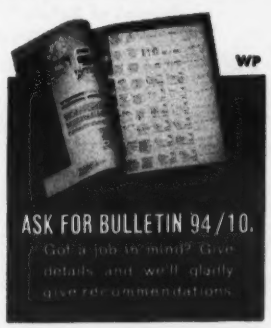
Saves time, ingredients, labor...puts end to spoiled batches...cleans up hazardous or messy conditions...provides accurate cost records. Accuracy is completely protected from effects of corrosion or corrosive wear. Only two moving parts in meter contact liquid. Gear train is outside the casing, isolated from liquid.

Size 1½", capacity 20 to 100 gpm. Also available with repeating Auto-Stop that "remembers" formula, and with ticket printing and electrical Auto-Switch combinations.

NEPTUNE METER COMPANY
Liquid Meter Division
47-25 34th St., Long Island City 1, N. Y.

neptune

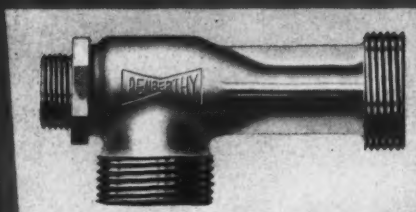
Branches in: ATLANTA • BOSTON • CHICAGO • DALLAS
PORTLAND, ORE. • LONG ISLAND CITY • DENVER
NO. KANSAS CITY, MO. • LOS ANGELES • LOUISVILLE
SAN FRANCISCO (Millbrae) • PHILADELPHIA (Bala Cynwyd)
In Canada: Neptune Meters, Ltd., TORONTO 14, ONT.

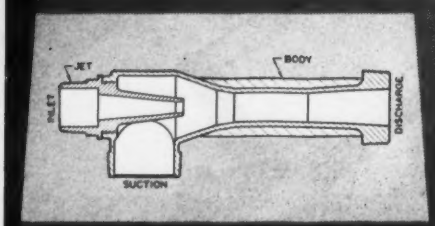


Check 1167 opposite last page.

VERSATILITY

for applications unlimited





JET PUMPS by PENBERTHY

There's hardly a basic manufacturing or service industry that hasn't a use for Penberthy Jet Pumps. And the list of OEM products embodying Jet Pump applications is virtually endless, too. Small wonder, for wherever there's a fluid, vapor, gas or slurry handling job to be done . . . aerate, agitate, blend, circulate, dilute, exhaust, filter, heat, mix, pump or transfer . . . there you'll find an application for *versatile* Penberthy Jet Pumps.

And consider the advantages . . . small in size, light in weight . . . construction and operation simplicity . . . low initial cost, low installation cost, little or no maintenance cost. And in many cases Penberthy Jet Pumps can be utilized where mechanical pumps are impractical or uneconomical. Want more information? Send the coupon below or call your nearby Penberthy engineer today.

PENBERTHY MANUFACTURING COMPANY
Division of Buffalo-Eclipse Corporation
PROPHETSTOWN, ILLINOIS
SALES OFFICE: 2660 E. GRAND BLVD., DETROIT 11, MICH.

PENBERTHY
Dedicated to Quality Since 1886

GENTLEMEN: Would like more information.
Please send your Jet Pump Catalog #512R.

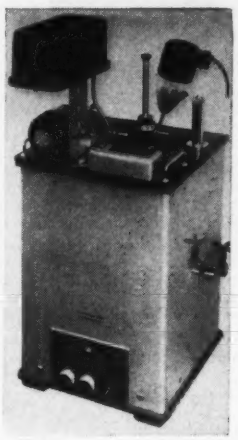
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

Check 1168 opposite last page.

Ultraviolet-analyzer source has intensity overseered electronically

The unit has been designed for standardization ease

Uses: Continuous indication on any clean, low-viscosity stream containing absorbers of 2537-angstrom absorption wavelength. With proper choice of UV source and filters, analyzer is applicable to recording of aromatics, ketones, aldehydes and dienes in either liquid or vapor state. It also may be used with inorganic materials as chlorine and mercury vapor.



Ultraviolet analyzer operates on 2537-angstrom absorption wave length

Features: Ultraviolet analyzer is design of Shell Development Company. It was originally produced to continuously record benzene (0 to 3%) in raffinate from an aromatics concentration unit.

Description: Explosion-proof analyzer includes electronic regulation of source density and means for periodical manual standardization.

Analyzer circuit comprises two ultraviolet-sensitive phototubes and associated cathode followers to give signal difference between outputs of a reference and a measuring circuit. This difference is measure of product concentration being analyzed. It can be recorded on potentiometer recorder which may include pneumatic transmission of con-

PALMER

Mercury Actuated Dial Thermometers now in three types to suit any requirements

PALMER
°F
PATENTED
FULL 4½" DIAL FACE. Stem can be placed at any angle and case can be rotated to any readable position.
1 RIGID STEM DIAL THERMOMETER tapered bulb, interchangeable with standard industrial thermometer separable socket. (As illustrated above.)
2 WALL MOUNTED DIAL THERMOMETER with flexible connecting armor. Case adjustable to easy reading position.
3 FLUSH MOUNTED DIAL THERMOMETER for panel mounting with flexible connecting armor.
ALL THREE TYPES HAVE A FULL 4½" DIAL FACE.

■ **for accuracy:** Mercury actuated . . . Compensated by Invar. Guaranteed Accurate 1 scale division. ■ **for angularity:** Can be adjusted to most readable position at any angle desired. ■ **for readability:** Bold Black Numbers . . . 11" of scale Reading Dial face can always be placed in easiest readable position. ■ **for interchangeability:** Also specify "PALMER" Separable sockets as they are interchangeable for Dial or Industrial type Thermometers.

PALMER

PALMER THERMOMETERS, INC.
Norwood Ave., Cincinnati 12, Ohio
MFRS. OF INDUSTRIAL LABORATORY, RECORDING AND DIAL THERMOMETERS

Check 1169 opposite last page.

troller features if desired.

A pair of ultraviolet sensitive phototubes are used: one in measuring beam through which sample flows, and other to provide reference signal for compensation of source-output variations. Changes in benzene concentration in sample flow cell affect signal in measuring half of circuit and difference is indicated on recorder.

(Ultraviolet analyzer 1272 is product of Hallikainen Instruments, 1341 Seventh St., Berkeley 10, Calif.)

Check 1170 opposite last page.

Wide-ranging temperature doesn't cramp style of chromatograph

Columns can be operated in ambient-500°C span

A programmed-temperature gas chromatograph has been designed to permit column operation from ambient to 500°C. Two symmetrically heated columns are used — one column for analysis, the other for discharges through reference detector for column vapor-pressure compensation.

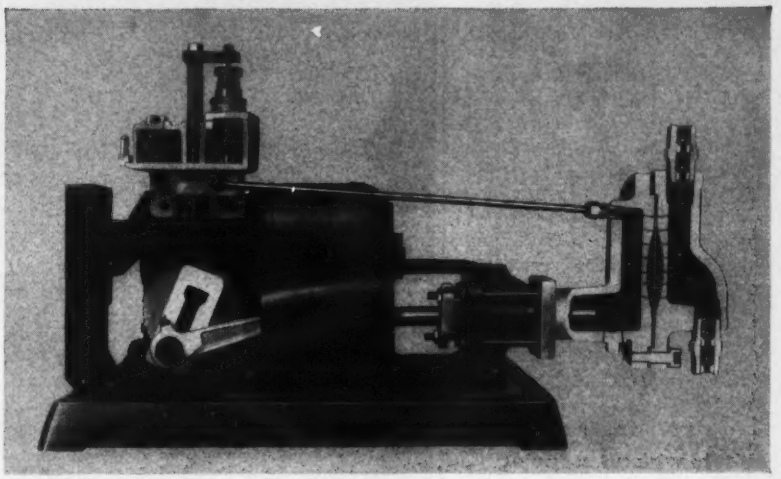
Both columns are identical and symmetrically heated. During temperature programming, column-packing vapor pressure increases at same rate in each. Thus, column partial-pressure background signals at reference and sample detectors are equal and opposite. This results in cancellation of temperature-dependent background signal.

Column temperature is programmed by use of cam-programmed controller. This permits exact reproduction of given temperature program. Cams may be cut for any type of program desired. Accordingly, linear programming, exponential programming or other profiles may be obtained. Unit permits symmetrical backflushing so that history of both reference and sample columns remain the same.

(Gas chromatograph 17 is product of Loe Engineering Company, 237 North Fair Oaks, Pasadena, Calif.)

Check 1171 opposite last page.

how to meter corrosive liquids safely and accurately



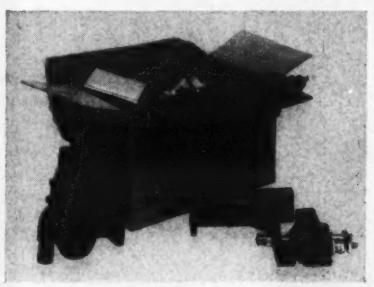
Cross-section of Milton Roy diaphragm pump shows how positive mechanical venting compensates for minor variables, eliminates air-binding.

THE problem of metering highly corrosive, toxic, or dangerous liquids can frequently be solved with a diaphragm type controlled volume pump. In this design, the plunger displaces a hydraulic fluid, which in turn moves the leakproof diaphragm to create pumping action through the ball checks.

Isolating the plunger and drive from the process fluid solves the corrosion problem, but it introduces another problem—air binding—that must be overcome to assure accurate, dependable metering. Milton Roy eliminates the air binding problem by automatically and mechanically venting the pump chamber once each stroke.

Air binding

The plunger, or hydraulic side of the diaphragm is essentially a *closed* system. An air bubble caught in this system contracts and expands with each stroke, destroying accuracy in proportion to the change in air bubble size. This "air binding" effect can reduce pumping efficiency to the point where pumping actually ceases!



This complete kit lets you convert any Milton Roy packed plunger MD pump to a diaphragm liquid end pump.

But that can't happen with a Milton Roy pump. For a brief period during each cycle, the reservoir ball check opens while the plunger reciprocates through a fraction of an inch without diaphragm motion. During the suction portion of the stroke, hydraulic fluid flows into the pump chamber to make up any losses. During the discharge portion, any excess fluid or air present is forced out of the system. This positive mechanical action not only eliminates air binding, but compensates for any minor variables which may affect pumping accuracy. Milton Roy takes the further precaution of isolating the hydraulic fluid from the drive train. There are no gears, worms, or trunnions beating air into the fluid.

Interchangeability

Any Milton Roy MD pump can be equipped with a diaphragm liquid end quickly and easily. A kit is available with all necessary parts and instructions. It's the ideal way to modernize your packed plunger pumps to keep pace with changing process requirements. Diaphragm liquid ends are available in steel, 316 SS, Milroy* SS, plastic, and special sulfuric acid construction. Diaphragms are either Teflon (standard), or 316 SS for process temperatures above 350 F. Complete pumps or conversion kits provide capacities up to 224 gallons per hour, pressures to 2,500 psi.

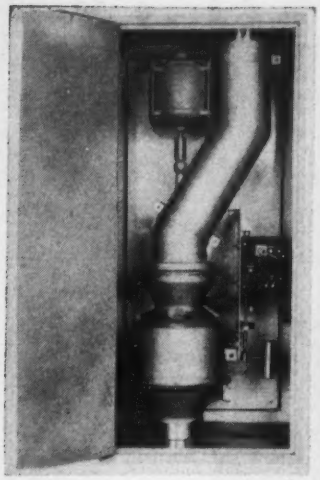
*Tradename of Milton Roy Co., Phila., Pa.

If the safe and accurate feed of hazardous, corrosive or toxic chemicals is one of your problems, look to Milton Roy's 25 years of experience for your most economical solution. Write for complete information on diaphragm pumps given in Bulletin 1157-3. Milton Roy Company, 1300 East Mermaid Lane, Philadelphia 18, Pennsylvania.

milton Roy
CHEMICAL INSTRUMENTATION SYSTEMS

Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • pH Instruments

Check 1172 opposite last page.



Meters without stopping dry-flowing materials

Uses: Weighing and metering of wide range of dry-flowing materials without interrupting flow.

Features: Variance confined to maximum of 1%, plus or minus.

Description: Meter operates on impact principle, translating unit weight of stream flow into electrical current via unique electronic transducer.

Optional instruments give direct readings in unit weight per unit time from local or remote stations, make permanent recordings of flow for future study, or totalize readings for any time period desired. Addition of controller and volumetric feeder permits automated control of process.

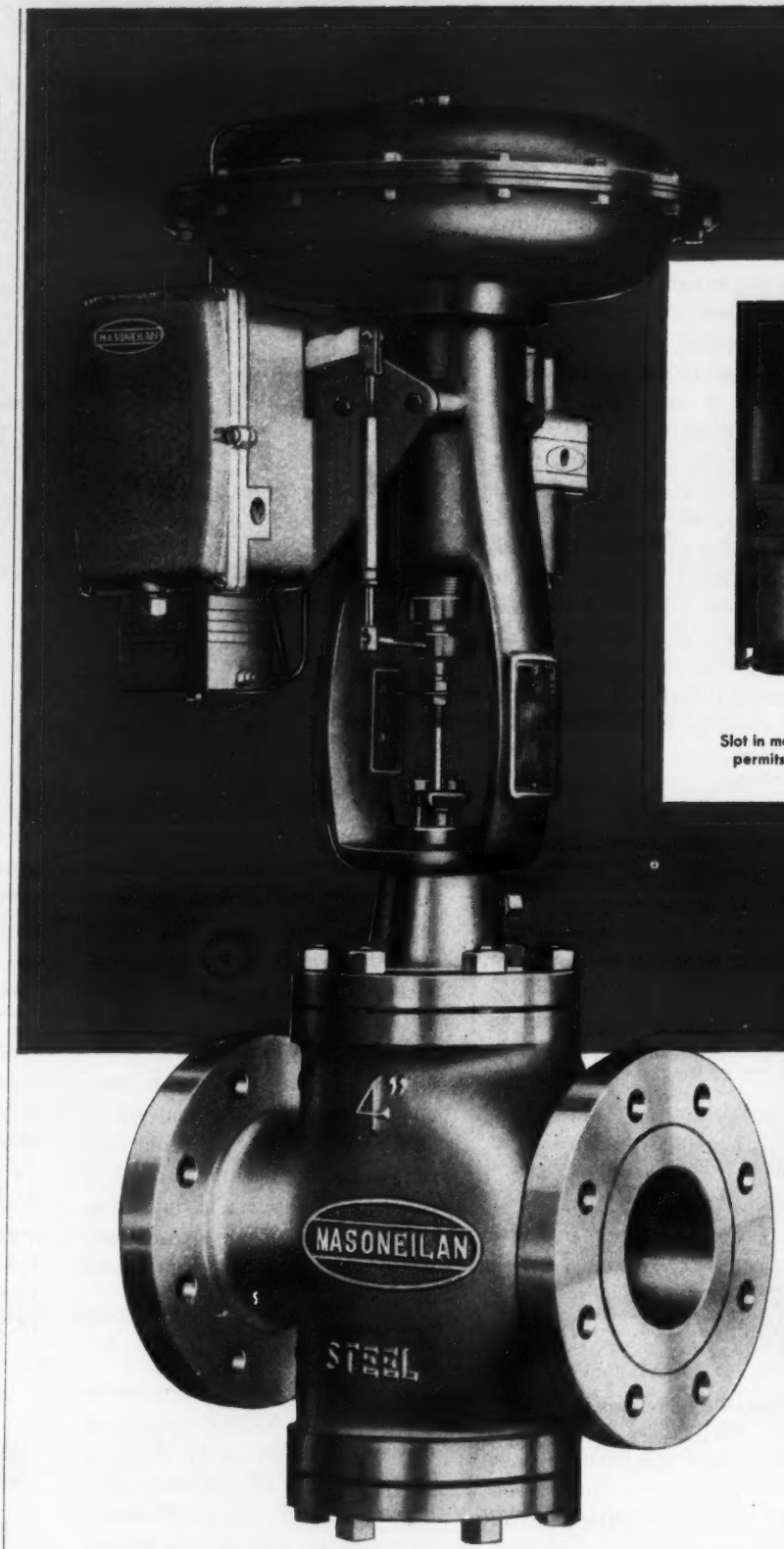
Meter is 46 x 22 x 16″ and usually can be installed in existing spouting systems during normal downtime period.

(IPI Dry-Flow Meters are development of Industrial Processes, Inc., 621 S. W. Morrison Street, Portland 5, Oregon.)

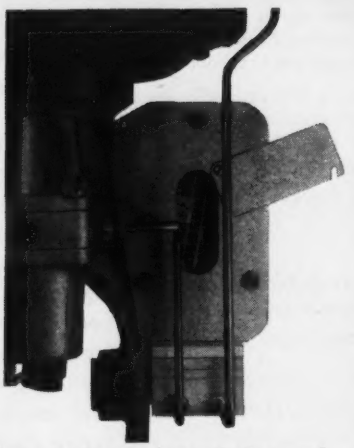
Check 1173 opposite last page.

Gas-density tale is told by balance unit

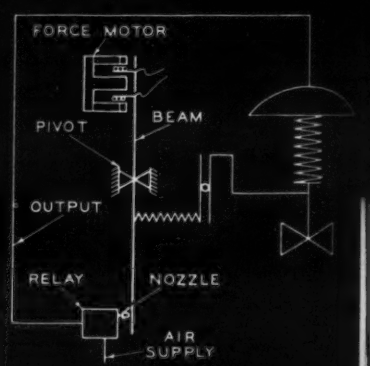
Uses: Process-stream density applications, such as for compositional analysis of two-component streams of substantially different densities and for continuous hydrogen readings on hydrogen-blan-



Model 8010 mounted on spring-diaphragm actuator. Note compact design.

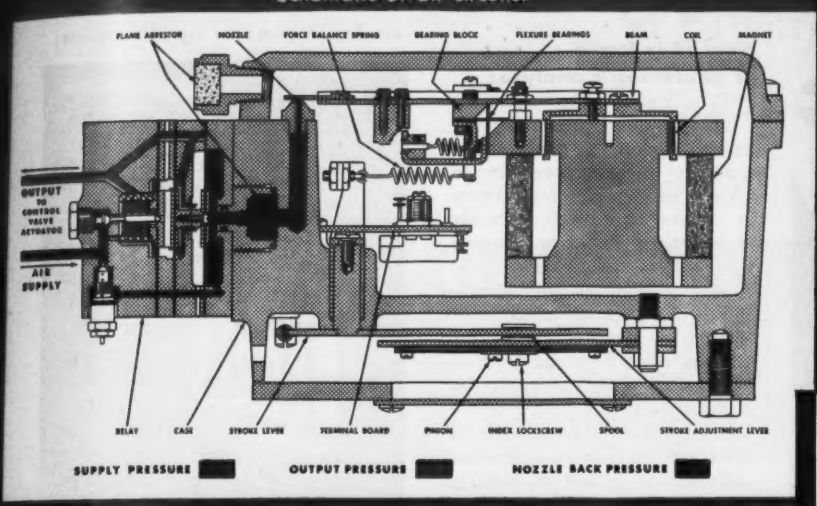


Slot in mounting plate (with swing-free cover) permits easy access to stroke adjustment.



Diagrammatic of operation.

Schematic of air circuits.



Speed The speed of the positioner, with integral relay and normal 20 psi supply pressure, is tabulated below:

ACTUATOR SIZE	VALVE STROKE (inches)	SPEED (seconds)
9	½	1.5
	¼	1.8
11	¼	2.8
	1	3.3
13	1	4.9
	1½	6.3
15	1½	9.4
	2	11.4
18	2½	21
	3½	29
	4	32

Performance Data

Open-loop Gain* — approximately 100
Linearity — within ±1% of full stroke
Repeatability — within 0.2%
Load Sensitivity — Output pressure change of 1.2 psi per 0.1% of full stroke offset
Supply Pressure Effect — ±1% of full stroke for ±5 psi change from 20 psi

Now!
Masoneilan
Electropneumatic Positioner
with Velocity
Feedback

Combines high open-loop gain and closed-loop stability to give you Precise Positioning and Superior Dynamic Response

The new Masoneilan Model 8010 Electropneumatic Positioner offers optimum performance plus these design advantages:

- A true positioner — *direct* comparison of valve stem position with controller output signal provides dynamic response and positioning accuracy not obtainable with transducer and pneumatic positioner combination.
- Electrical circuit easily adapted to a variety of controller output signals.
- Extra large stabilized magnet, plus efficient magnetic circuit, provides high force changes.
- Explosion-proof construction meets requirements of Class I, Division I, Group D.
- External stroke adjustment accessible without removal of cover — no exposure of electric wiring.
- High capacity relay for fast stroking speeds. Relay may be mounted in any one of four positions to facilitate piping.
- Balanced beam permits installation of valve in any position without shift in calibration.
- Available for 3-15 psi or 6-30 psi valve spring ranges and for split-ranging. Standard stroke ranges ⅜"–3" and 2"–4". Others available.
- Available with direct or reverse action and for direct or reverse actuators.

You can now utilize the desirable characteristics of electronic control and obtain the power and smooth throttling action of pneumatic valves by using Masoneilan Electropneumatic Positioners. Full details on request. Ask a Mason-Neilan representative or write direct —

MASONEILAN

MASON-NEILAN

Division of Worthington Corporation
25 NAHATAN STREET, NORWOOD, MASS., U. S. A.
Sales Offices or Distributors in Principal Cities in United States and Abroad
In Canada: Worthington (Canada) Ltd., Mason-Neilan Division

MNO-19

Check 1174 opposite last page.

keted turbine generators.

Features: Balance's measuring cell responds to changes in density quickly. 95% of any reading is obtained in less than one minute. Scale is linear over entire range.

Description: Continuous gas-density balance consists of measuring cell, amplifier, power supply and temperature controls. It is housed in steel case and can be either wall- or panel-mounted.

Sensing element is tiny dumbbell supported on quartz fiber. Each sphere has different buoyancy characteristics. Two fixed potential electrodes create field around one sphere. Variable potential applied to rhodium-coated sphere stabilizes dumbbell in field. Mirror fixed to dumbbell's axis reflects beam to a dividing mirror. This splits beam equally between two photocells.

If dumbbell is unstabilized (tends to rotate) light beam is unevenly divided. Thus, photocells produce unequal signals.

In operation, continuous sample-gas flow enters cell, causing spheres to react with unequal buoyancy. Resulting torque requires electrical potential to keep dumbbell stabilized. Measuring this torque results in density signal.

(Continuous gas density balance 3A is fully explained in Bul GA-4004, Scientific & Process Instruments Division, Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.)

Check 1175 opposite last page.

Chemical-kinetics models' correlation and optimization is subject of a 26-page report outlining a new and rapid procedure. A least-mean-squares evaluation of constants from observed data provides correlation for model development; model is then optimized to determine most economic operating conditions. A complete solution with accuracy of ±0.1% can be obtained for given process in less than three minutes after data has been set in computer. Report outlines how constants may be evaluated for two-stage constant-pressure, chemical reaction from isothermal pilot-plant data. Form 80-105-003 — Computer Systems, Inc.

Check 1176 opposite last page.

NEW SCAM® MAGNA-PLAC NAMEPLATE

70% more annunciator engraving area for fuller descriptions, larger characters

Your systems' sentry, Scam De-Line annunciators, now offers a new MAGNA-PLAC nameplate which provides a full 10½" of engraving area—70% more than conventional nameplates.

MAGNA-PLAC gives engineers increased area to more accurately describe condition variations or to employ larger characters for greater visibility. MAGNA-PLAC is interchangeable with standard Scam nameplates and optionally available on De-Line units *without extra charge*.

Other De-Line features include side by side or stack mounting for practical, *economical* system expansion; a single plug-in relay for both normally open *or* normally closed contacts; and sequence options *after* installation.

Yes, continuous product improvements such as MAGNA-PLAC, flexible application, ruggedness and reliability are what make De-Line the engineer's annunciator.

Complete Monitoring Systems for Industry

SCAM® INSTRUMENT CORP.

Dept. D, 3101 North Lowell Ave., Chicago 41, Ill.

Representatives in Principal Cities

WRITE FOR MORE INFORMATION on De-Line MAGNA-PLAC. Just sign and attach coupon to company letterhead.

NAME _____

Check 1177 opposite last page.

Near IR is locale of photometric analyses

Operating in the near-infrared region, a photometric analyzer incorporates simple system of interference filters to isolate two narrow bands of radiation. These are passed alternately through sample. One is chosen at wavelength where little or no absorption occurs in sample; the other is selected where component of interest has characteristic absorption band.

Lead-sulfide detector is used to convert transmitted radiation to pulses of electric current. These are amplified, the ratios being recorded. This provides measure of concentration of component of interest. One major application is measurement of small quantities of water in various hydrocarbons.

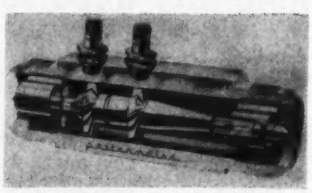
(Photometric analyzer 500 is product of Analytic Systems Company, 980 N. Fair Oaks Ave., Pasadena, Calif.)

Check 1178 opposite last page.

Mass flow is measured to accuracy of ±¼%

Uses: Mass-flow measurement of liquids or gases.

Features: Flowmeter provides repeatable accuracies to ±¼% of reading with linear response over a 10-to-1 range. Mass flowmeter is self-contained. It requires no external power source or intermediate specific-gravity correction.



Self-contained mass flowmeter requires no external power source or intermediate specific-gravity correction

Description: Transducer incorporates rotor having two sets of turbine blades with different blade angles, coupled by spring and capable of relative angular motion with re-

Versatile new electronic relays END PRODUCT CONTAMINATION *on level control applications!*

B|W

Electronic Liquid Level

CONTROLS

Now—two new performance-proved electronic relays that provide accurate, reliable, floatless means of controlling any conductive liquid or moist bulk material having a resistivity of up to 12.5 megohms!

☐ Outstanding features and characteristics include: Positive means of adjusting sensitivity for specific applications. Very low electrode potential and low electrode current. No shock or sparking hazards. No product contamination due to electrolysis. Quick and easy conversion for direct or inverse operation. And, because both relays will operate several miles away from the level sensing electrodes, they permit accurate control of liquids from remote locations.

Other reliable B/W Floatless Liquid Level Control Equipment

Induction Type Relays

Automatic Alternators

Signals and Alarms

Electrodes and Holders

Complete technical data available upon request—write today!

THE B|W CONTROLLER CORPORATION

2200 E. MAPLE ROAD • BIRMINGHAM, MICHIGAN

Manufacturers of Liquid Level and Industrial Motor Controls

Check 1179 opposite last page.

spect to each other. As result of blade-angle difference, two sets of blades tend to rotate at different speeds, but are retained by spring coupling.

Magnitude of resulting angular displacement with respect to each other is proportional to flow momentum. However, rotor assembly, (considered as unit) functions as volumetric turbine meter, rotating at speed proportional to average fluid velocity.

Thus, by measuring elapsed time taken for phase-angle displacement to traverse reference point, direct mass-flow-rate measure is effected and can be observed and recorded on any laboratory type counter or oscilloscope. Unit operates in range of −430 to +850°F.

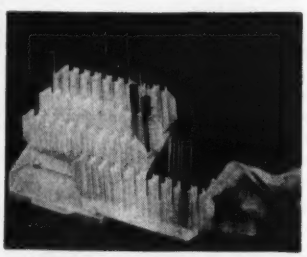
(Mass Pottermeter 3000 is product of Potter Aeronautical Corporation, Union, N.J.)

Check 1180 opposite last page.

Test-tube contents are revealed to all

An Italian test-tube-rack design permits full view of tube contents. Rack, as well as bases, are made of virgin high-density polyethylene.

The rack is safely immersible in water baths (will withstand 120°C). Supports are available as free-standing



Test-tube-rack design permits full view of tube contents

units (with capacity for nine 18-mm or ten 16-mm test tubes) or with polyethylene bases designed to hold two or four rack units.

(Nalgene test-tube-racks are product of The Nalge Company, Inc., 75 Panorama Creek Dr., Rochester 2, N.Y.)

Check 1181 opposite last page.

Wrap up high temperature laboratory heating problems fast with new CAL-CORD*

Here's news from Glas-Col . . . a new, flexible cord developed especially for high temperature laboratory heating applications. It's easy to use . . . as flexible as an appliance cord . . . and delivers uniform temperatures. Cal-Cord comes complete with cord and plug. There are no troublesome loose terminals on the ends.

TWO SIZES—400°C and 600°C

Medium "Cal-Cord"—400°C Specifications

Catalog No.	Length	Wattage	Price
C-C 2	2-ft.	80W, 115V	$ 6.50
C-C 3	3-ft.	120W, 115V	9.00
C-C 4	4-ft.	160W, 115V	11.00
C-C 6	6-ft.	240W, 115V	15.00

Made of glass fabric materials. Can be furnished for 220V operation.

Super "Cal-Cord"—600°C Specifications

Catalog No.	Length	Wattage	Price
SC-C 2	2-ft.	200W, 115V	$ 8.00
SC-C 3	3-ft.	300W, 115V	13.75
SC-C 5	5-ft.	500W, 115V	18.00

Made of quartz fabric materials. Can be furnished for 220V operation.

CAL-CORD TEMPERATURE CONTROL
This Thermolyne Stepless Type 800 temperature controller, recently developed, is ideally suited for use with "Cal-Cords." It's a 115V unit. Maximum amps: 13. Watts: 1500. Price $15.75.

*Patent Pending

Write for information on "Cal-Cord" today!

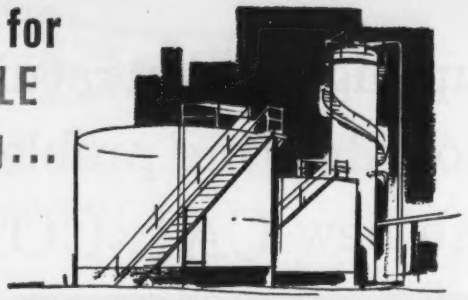
GLAS-COL Cal-Cords

Dept. CP, 711 Hulman St. Terre Haute, Indiana

World's largest manufacturer of heating mantles for laboratory, pilot plant, and chemical process heating applications.

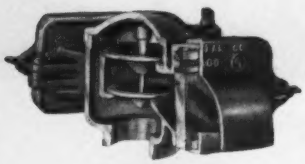
Check 1182 opposite last page.

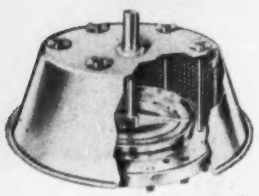
PROTECTOSEAL for SAFE FLAMMABLE LIQUID Handling... Tank Storage, Processing, Testing, Research



The Protectoseal Line of storage tank vents and fittings includes operating, emergency, and special purpose equipment to meet virtually any requirement of fire prevention and vapor control. In providing proper fire and explosion protection for over 35 years Protectoseal Engineers always consider the operating and maintenance problems of corrosion, sublimation, valve pressures, conservation, cleaning of flame arresters, or other situations peculiar to a given installation.

Two widely used units are illustrated here under the following headings:





CONSERVATION VENTS

Designed with flame arrester structure *outside* the vent housing. Advantages: (1) In event of ignition, vent burns at flame arrester—not the valves. Prevents warping and malfunction; (2) Flame arrester plates not continuously exposed to possible corrosive vapors; (3) Flame arrester structure keeps dirt and other foreign matter away from valves which might cause improper valve seating; (4) Self-draining of condensate. Protectoseal conservation Vents are UL and FM approved, and are made in a wide range of sizes.

EMERGENCY RELIEF VALVES

Provide emergency relief capacity beyond that furnished by operating vent. Free-lifting, self-closing valve is designed to relieve at 1 ounce/sq. in. settings up to 10 ounces/sq. in. can be provided. Metal-to-metal seat; non-metallic seat available. Coarse mesh screen prevents entry of foreign matter. Weatherhood protects entire valve. Emergency equipment available in complete range of sizes to 20½ inches.

Write for Protectoseal "Blue Book"—a complete and informative reference guide to storage tank equipment selection, design, and operation.

LABORATORY EQUIPMENT

OVAL SHAPE SAFETY STORAGE AND DISPENSING CANS — require less shelf space, permit storage of five containers in space normally required for three round cans. Flame arrester protection at all openings. Convenient handles, automatic pressure relief, liquid tight seals, available in stainless steel, Terne Plate.

SAFETY TILT CAN ASSEMBLIES — easily tilted for accurate, dripless dispensing from self-closing faucet. Can returns to vertical position when released. Flame arresters at all openings. Also available for wall mounting.

LIQUID DISPOSAL CANS — large receiving spout for easy waste liquid disposal. Cap opens wide, may be locked open. Stainless steel or Terne Plate body. Flame arrester protection at receiving opening. Automatic pressure relief, leak-proof cap seal. 2 sizes: 2 gallons, 5 gallons.

STAINLESS STEEL DRUM FAUCETS — self positioning — may be screwed into drum bung opening and spout swivels to dispensing position. Automatic closing. Dripless valve with Teflon Seal. Flame arrester protection. Available for ¾" NPT opening.

Write for Protectoseal "Red Book"—contains flammables engineering fundamentals and guide to equipment selection.

THE PROTECTOSEAL COMPANY

1932 South Western Avenue • Chicago 8, Illinois

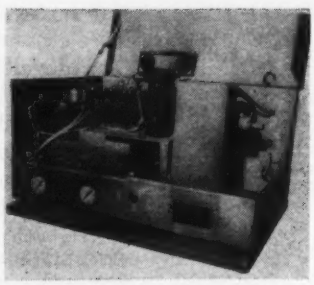
Check 1183 opposite last page.

Even ppm-ppb impurities fail to slip unnoticed past flame photometer

Uses: Photometric monitoring of process-stream impurities.

Features: Photometer measures elements in ppm and ppb range on continuous basis.

Description: Flame photometer consists of two parts: optical unit and control panel. Optical assembly houses sample manifold, burner, monochromator and photomultiplier. Control panel houses high-voltage supply, amplifier, automatic standardizing system, sample sequence selector and recorder.



Minute impurities of elements in process streams can be monitored continuously with flame-photometer analyzer

Single or multi-point manifold system may be selected. One of the sample streams being fed to analyzer is selected automatically in sequence and passed to the burner unit. When an emitting impurity is present in sample, characteristic radiation of material emitted shows up. Grating monochromator isolates spectral region from flame background emission. This radiation is detected by photomultiplier.

Output of photomultiplier tube is 90-cy/sec. signal voltage. This is amplified by preamplifier in photomultiplier housing. It is then conducted to amplifier in control panel where it is rectified and measured by recording potentiometer.

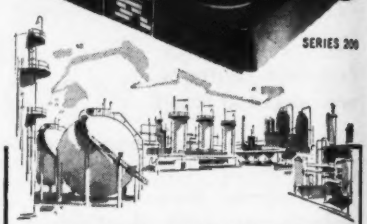
(Flame photometer is product of Waters Associates, 45 Franklin St., Framingham, Massachusetts.)

Check 1184 opposite last page.

ACCURATE CHEMICAL FEEDING

FROM .65 gph TO 1624 gph

SERIES 200



AMERICAN PROPORTIONING PUMPS have repetitive metering accuracy of ± 1% when operating between 10% and 100% of capacity. Feed precisely metered fluids or slurries in all ratios, with controlled process variables.

- interchangeable liquid ends
- spherical self-aligning bearings on crank and crosshead
- crossheads of hardened and ground steel ride on cast iron
- nylon dust covers protect bearings
- NEMA frame motors
- heavy duty reducers

Send for free bulletin.

SERIES 100
Simplex models pump up to 13.10 gph at maximum pressure of 1000 psi. Duplex models double that capacity.

SERIES 200
Simplex models pump up to 812 gph at maximum pressure of 1000 psi. Duplex models double that capacity.

SERIES 100

AMERICAN METER COMPANY
INCORPORATED · ESTABLISHED 1836
pump division
13500 PHILMONT AVE., PHILADELPHIA 16, PENN.

Check 1185 opposite last page.

NEW LITERATURE

Process Instrumentation and Laboratory Apparatus

Environmental-testing and other applications for controlled-atmospheric conditions is subject of 32-page brochure summarizing latest known data at altitudes from sea level to two million ft. It shows specific weight, pressure, acceleration of gravity, and molecular weight at various altitudes. Other charts give technical information on atmospheric temperature and humidity. Brochure 600—Webber Manufacturing Co., Inc.

Check 1186 opposite last page.

Paper electrophoresis is subject of eight-page brochure describing application of high-resolution buffer to such equipment. Brochure 3276-04—LKB Instruments, Inc.

Check 1187 opposite last page.

Mathematical applications of the dynamic-storage analog computer are topic of 16-page technical report detailing applications of computer which innovates automatic repetitive operation at frequencies of 60 cps and high-speed memory with tracking error of less than one microsec. "Mathematical Applications of the Dynamic Storage Analog Computer"—Computer Systems, Inc.

Check 1188 opposite last page.

Sorptometer operation, construction, theory of measurement, and specifications are reviewed in four-page Sorptometer 212 Brochure—Perkin-Elmer Corporation.

Check 1189 opposite last page.

Replaceable thermocouple-assembly components are specified in 28-page catalog, covering bare elements, elements with insulators, insulators, metal and ceramic protecting tubes, heads, blocks, connectors and miscellaneous fittings. Cat C 100-3—Industrial Division, Minneapolis-Honeywell Regulator Company.

Check 1190 opposite last page.

High-vacuum systems of glass and accessories are drawn and described in 32-page Cat 60-D—Delmar Scientific Laboratories.

Check 1191 opposite last page.

Laboratory equipment line is indexed in 142 page catalog, covering industrial metal laboratory furniture, fume hoods and plumbing and electrical fixtures. Several pages are devoted to how laboratory assemblies are built-up, laboratory work tops and metal-furniture construction details. Cat 109—Kawaunee Technical Furniture Company.

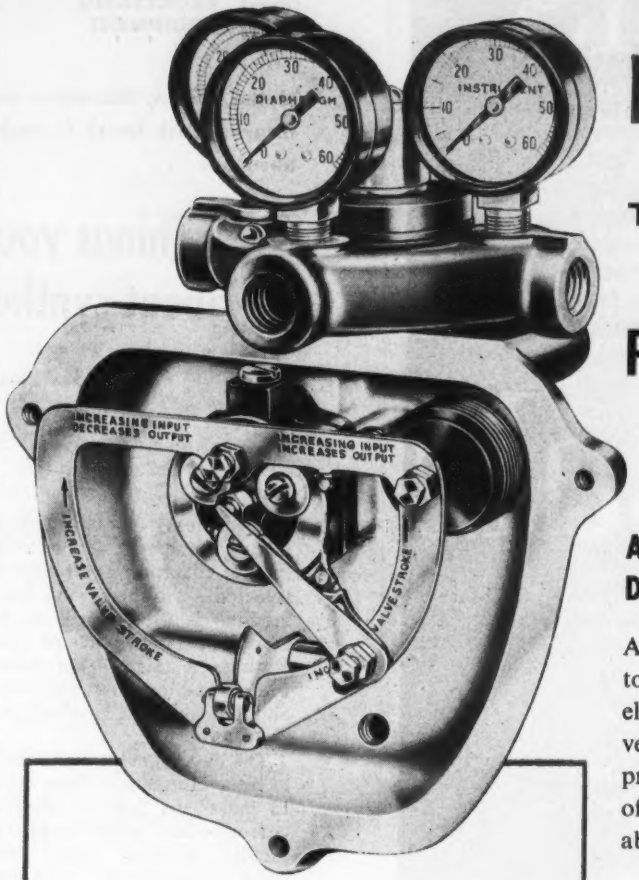
Check 1192 opposite last page.

A new concept in design makes possible the...

FISHER

TYPE 3560 VALVE POSITIONER

V/P



Assured product performance through DYNAMIC ANALYSIS engineering

Application of mathematical techniques of design to pressure control systems has enabled Fisher to eliminate the conventional approach in the development of the new V/P valve positioner. It has provided the V/P with the following combination of characteristics and performance . . . unobtainable in any other type of valve positioner.

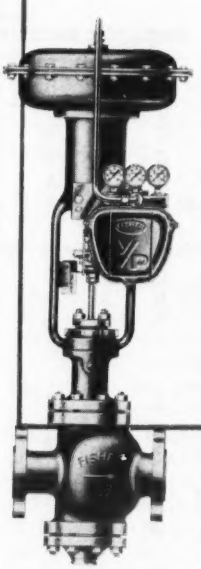
SMALL AND COMPACT . . . only 6⅝" wide and 8¾" high (with gauges).

CONVENIENT ADJUSTMENT . . . valve stroke and zero adjustment readily accessible and easy to make.

SPLIT RANGE . . . no parts change whatsoever is required for split range operation.

EASILY REVERSIBLE . . . reversed by simply moving flapper arm from one beam quadrant to the opposite quadrant.

CHARACTERIZED CAMS . . . offer wide flexibility in valve characteristics.



PERFORMANCE DATA

Hysteresis, (Average)	0.0012"
Linearity	as required. Change cams to obtain desired characteristics
Sensitivity	0.14 psi
Resolution Sensitivity	0.002 psi
Repeatability	±0.0003"
Stroking Speed	0.37 in/sec.
Air Consumption	10 scfh
Break Frequency (5% of instrument pressure range)	3.9 cps
Break Frequency (3% of instrument pressure range)	4.6 cps

The above performance data was taken from laboratory tests on a Type 657 diaphragm actuator, Size 40, with 1½" travel. Instrument range 3 to 15 psi.

Write today for Bulletin E-3560

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD . . . CHANCES ARE IT'S CONTROLLED BY . . .

FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Ontario / Rochester, England

BUTTERFLY VALVE DIVISION: CONTINENTAL EQUIPMENT COMPANY, CORAOPOLIS, PA.

FISHER

SINCE 1880

Check 1193 opposite last page.

screens

GREATEST CAPACITY, per-square-foot of screen cloth area • EFFICIENT FOR ALL MATERIALS, wet or dry, fine or coarse, hot or cold • EASY TO INSTALL, light-weight, no transmitted vibration • ECONOMICAL OPERATION, low maintenance • FLEXIBLE, 18", 30" & 48" dia. units, single or multiple separations • CLEAN SEPARATION, ACCURATE SIZING, in range from coarse to 325-mesh • LONG SCREEN CLOTH LIFE, less blinding • SELF-CONTAINED, ready to operate.

chemicals

SWECO Vibro-Energy Separators screen a wide range of products for the chemical processing industry, faster and better. For example: Industrial organic and inorganic chemicals. Drugs and cosmetics. Vinyl, polyethylene, and other plastic pellets. Soaps and detergents. Urea, phosphate and other fertilizers. Latex and other rubber materials. Waste fluids. Paint pigments, and many other products.

For technical data or free screening demonstration in *your* plant, with *your* materials, write: Dept: 3-3

SOUTHWESTERN ENGINEERING COMPANY

4800 Santa Fe Avenue, Los Angeles 58
Engineers • Constructors • Manufacturers

Check 1194 opposite last page.

cp PROCESSING EQUIPMENT

Nylon, Orlon, Dacron — which cloth fits your filtering task best? To make selection easier, here are . . .

Things you should know about synthetic filter fabrics

HARRY BALL, Technical Director
Technical Fabricators, Inc.
Nutley, New Jersey

Regardless of how much money is spent — or what type of filtration equipment is selected — if the wrong filter medium is used there can be trouble. Proper choice of filter cloth is a mighty big factor in determining how effectively and efficiently a product can be filtered.

The development of synthetic filter fabrics has done much to make the task of filtering corrosive and other tough-to-handle slurries easier and more economical. Although names of these fibers are well known, there is still doubt in the minds of many as to what each of these fabrics can (or cannot) do.

Which cloth should be selected for a specific filtration application? Which one will do the best job at lowest cost? Often there is no single answer. However, to help you narrow down the field the next time you are faced with this situation, here is a quick run-down on what important synthetic fabrics are available and what kind of performance you can get from them.

Resistance of fibers to acids and bases

Acids	Nylon	Orlon	Dacron	Polyethylene	Acrilan	Saran	Dynel	PVC	Teflon	Polypropylene
Acetic	A	A	A	A	A	A	A	A	A	A
Aqua Regia	C	B	B	A	C	A	B	B	A	A
Benzoic	C	A	B	A	A	A	A	A	A	A
Carbolic	C	A	B	B	B	B	A	B	A	A
Chromic	C	A	B	A	C	B	B	B	A	A
Formic	B	B	A	A	C	A	A	A	A	A
Hydrochloric	C	A	B	A	B	A	A	A	A	A
Lactic	B	A	A	A	A	A	A	A	A	A
Nitric	C	B	B	B	B	A	A	A	A	A
Oxalic	C	A	A	A	A	A	A	A	A	A
Phosphoric	B	A	A	A	A	A	A	A	A	A
Sulfuric	C	B	B	A	B	B	A	A	A	A
Bases										
Ammonium Hydroxide	A	C	A	A	C	C	A	A	A	A
Calcium Hydroxide	A	A	A	A	A	A	A	A	A	A
Potassium Carbonate	A	B	A	A	B	A	A	A	A	A
Potassium Hydroxide	A	C	C	A	C	A	A	A	A	A
Sodium Carbonate	A	A	A	A	B	A	A	A	A	A
Sodium Hydroxide	A	C	C	A	B	A	A	A	A	A

A—Recommended; B—Satisfactory; C—Not Recommended

Nylon

Nylon is the oldest true synthetic fiber. Commercially available since 1939, it is one of the strongest fibers known. It loses only 15% of its strength when wet. Because of its superior abrasion resistance (three times that of wool) it has become increasingly important as a substitute for cotton filter fabrics.

It possesses good elasticity, making it ideal for applications where cloth is subjected to continuous flexing such as on horizontal filters, scraper-discharge filters and dust collector bags.

Nylon is unaffected by practically all solvents except Synasol and *m*-cresol. Its acid resistance, however, is extremely low, and values less than pH 4-5 should be avoided.

Orlon

Orlon has good to excellent resistance to acids, but only moderate resistance to alkalis. It is considered satisfactory for applications up to 300°F. It is practically impervious to water absorption and has excellent oxidation resistance.

Orlon is unaffected by solvents such as alcohol, benzene, carbon tetrachloride, many ketones and aliphatic hydrocarbons. Nor is it affected by greases, oils, neutral salts and most acid salts.

Orlon dissolves in sulfuric acid concentrations above 80%. It is also attacked by aniline, glyoxal, phenol, pyridine and resorcinol.

Dacron

Because they shrink during heat setting, Dacron fabrics are tight and have high solids retention and good cake release properties. Dacron has good acid resistance (except for concentrated solutions of sulfuric or nitric acid). In many cases its alkali resistance is superior to Orlon.

Dacron withstands dry temperatures up to 350°F. Hydrolysis causes degradation of the fiber. Product is practically unaffected by solvents, except aromatic phenols.

Polyethylene

Low-density material has excellent resistance to most acids and alkalis, limited resistance to aliphatic and aromatic solvents. Good elasticity makes it ideal for use on continuous horizontal filters where air blows are used. A relatively weak fiber, material is not recommended for use above 165°F.

High-density polyethylene can withstand 230°F, has superior strength and resists abrasion. Elasticity, however, is poor. Because of its waxy and smooth surface it is difficult to blind and provides excellent cake release. Good fabric for rotary filters having scraper discharge.

To next page

Physical properties of synthetic filter fabrics

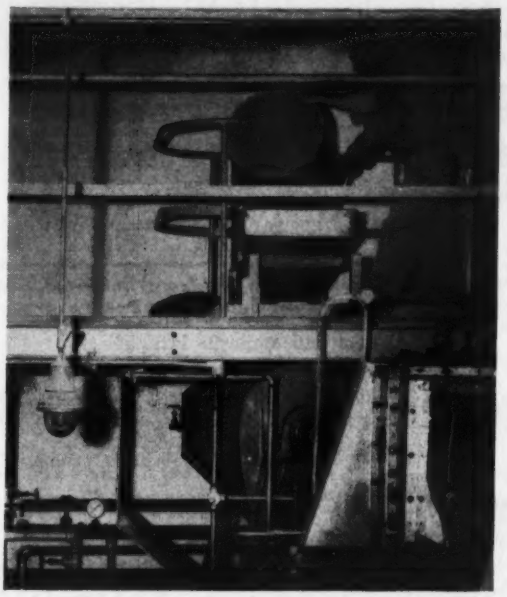
Fiber	Use Temperature, °F	Specific Gravity	Approximate Tensile Strength (in 1000 psi)
Nylon	225-250	1.14	100 (F), 65 (S)
Orlon	275-300	1.14 - 1.17	70 (F), 34 (S)
Dacron	300-325	1.38	100 (F), 70 (S)
Polyethylene,			
Low-density	150-165	0.92	25 (M)
High-density	200-230	0.92	85 (M)
Acrilan	275-300	1.13	40 (S)
Saran	160-180	1.70	45 (M)
Dynel	175-200	1.31	55 (S)
PVC	145-150	1.38	80 (F)
Teflon	475-500	2.30	50 (F)
Polypropylene	250-275	0.90	85 (F), 50 (S)

F—Filament Yarn, M—Monfilament Yarn, S—Staple Yarn

PAUL O. ABBÉ

ROTA-CONE DRYER

"PRODUCES MORE UNIFORM PRODUCT" PHARMACEUTICAL FIRM FINDS



"We find that the tumbling action employed in your 'Rota-Cone' dryer produces a more uniform product than our old tray-drying method, by providing a mixing action as it dries," an important pharmaceutical firm tells us.

"The tumbling action provides contact of the material with the heated surface, so it assures more even drying. A vacuum also removes the moisture-laden air and so makes it possible to dry not only more evenly, but at lower temperatures."

The manufacturer also reports no decomposition of the material—which occurred when tray-drying was employed. They add: "Your 'Rota-Cone' has many advantages in comparison with tray-drying. Our material gets less exposure to dirt, the machine is more economical of space, and 1/3 less labor is required. Temperatures too, are automatically controlled at 30°C. to 90°C."

Paul O. Abbé "Rota-Cone" Dryers are used today for metal powders, chemicals in powdered, flaked, and granular form, textiles, pharmaceutical powders, plastic resins, and other products.

For full details of these machines, write today for our 12-page brochure "C". No obligation.

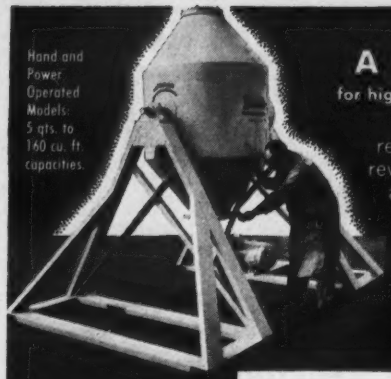
PAUL O. ABBÉ

402 CENTER AVE. LITTLE FALLS, NEW JERSEY

BALL & PEBBLE MILLS
DRY & PASTE MIXERS
DRYERS & BLENDERS

Check 1195 opposite last page.

DAFFIN MACLELLAN MIXERS



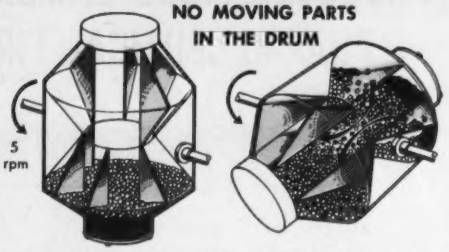
Hand and Power Operated Models: 5 qts. to 160 cu. ft. capacities.

A MIX IN A MINUTE

for high volume production or laboratory use.

A complete mix is made in 5 revolutions. No additional number of revolutions will unmix it. Scientifically accurate mixing of dry, free-flowing materials of every kind. Guaranteed satisfactory results regardless of percentages or relative weights. No variations within the batch. Increased output with 1/20th conventional power requirements.

NO MOVING PARTS IN THE DRUM



5 rpm

Fixed baffles spread ingredients into 6 batches every half revolution . . . repeatedly combining, dividing, pyramiding, blending . . . gently without rubbing or particle reduction. Fast, easy loading, unloading, cleaning.

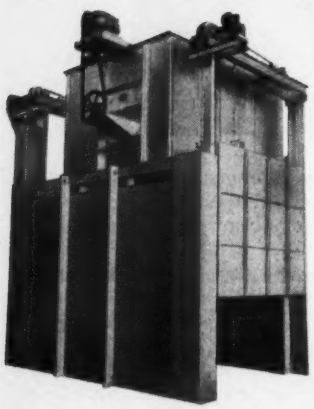
Write for free Bulletin X-80 describing

Daffin MACLELLAN MIXERS

DAFFIN MANUFACTURING CO., Division of Daffin Corporation
3358 North Prince Street, Lancaster, Pennsylvania

Check 1196 opposite last page.

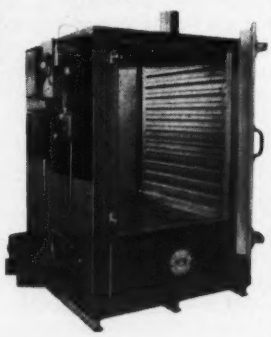
Recirculation heating at its BEST



FAST-UNIFORM DRYING BAKING • CURING in ROCKWELL OVENS

These two ovens are typical of thousands of Rockwell units serving American chemical process heating needs. Get Bulletin 127 for more details.

Truck oven, doors at both ends; for sintering ores at 1200°F. Air from external gas-fired heater is directed by re-circulating fan through louvers across the work load. Stainless steel interior withstands corrosive vapors.



Electric, tray-loading cabinet oven for cross-flow heating to 500°F.; equipped with operating and safety controls. Can be gas-heated.

ROCKWELL SINCE 1888 BUILT

W. S. ROCKWELL COMPANY

FURNACES · OVENS · BURNERS · VALVES · SPECIAL MACHINERY

2200 Eliot Street • Fairfield, Conn.

Check 1197 opposite last page.

PROCESSING EQUIPMENT

From preceding page

Acrilan

Resistance to chemical attack is similar to that of Orlon. Fiber has excellent resistance to alcohols, ketones and esters. It is not recommended for use in mineral acid concentrations above 10% at 212°F, but is unharmed by oils, greases and aliphatic hydrocarbons. Alkali resistance is generally poor. Use with weak alkalis at low concentrations is acceptable.

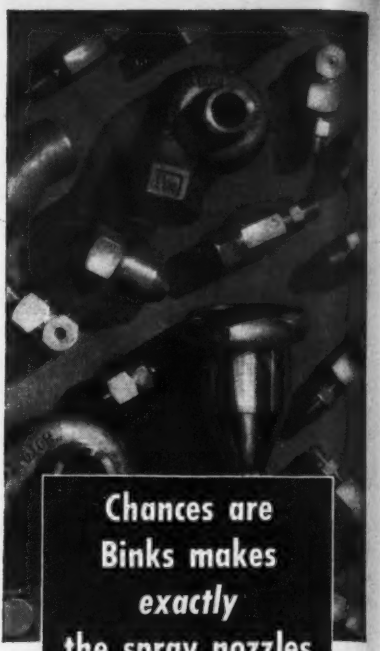
Saran

Heaviest of synthetic fibers. Smooth surface of monofilament yarn gives excellent cake release properties. Good resistance to all acids and alkalis except strong sulfuric acid and ammonium hydroxide. At room temperature, the material is unaffected by most aliphatic and aromatic hydrocarbons, ketones, oils and alcohols. Not suitable for use with ethers, esters and solutions containing chlorine and bromine. Temperature limitation normally is about 170°F; this may be upped to 200°F in some cases.

Dynel

Excellent resistance to concentrated mineral acids and salts. Safe peak temperature is usually 165°F.

Unsuited for use with ketones, certain amines and aromatic hydrocarbons at elevated temperatures. When



Chances are Binks makes *exactly* the spray nozzles you need

for washing, cooling, processing, humidifying, dehydrating and hundreds of other applications.

Whatever your production or process requirements...you'll get the *right* spray nozzles quicker by calling Binks.

There is a size and spray pattern for every purpose...with nozzles cast or machined from standard or special corrosion-resistant metals and materials.

Send for Catalog 5900

Gives details on nozzle applications, sizes, capacities, spray patterns and metals. Easy to use selection tables.

Binks Manufacturing Co.
3120-32 Carroll Ave.
Chicago 12, Ill.

Send me your comprehensive Spray Nozzle Catalog 5900—*no obligation, of course.*

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

7047

Binks

A COMPLETE LINE OF INDUSTRIAL SPRAY NOZZLES AND COOLING TOWERS

MAIL COUPON NOW

Check 1198 opposite last page.

Problem:

To speed up pepper grinding without losing volatile oils

Solution:

SPROUT-WALDRON
ROLLER MILLS

To grind pepper to −40 mesh at production rates from 2-3000 pounds per hour without generating excessive heat or causing unnecessary loss of volatile oils, Durkee Famous Foods, Bethlehem, Penna., installed a Sprout-Waldron pepper grinding system.

Heart of the system is the one-point control double roller mill. Design of this unit permits operator to set and align rolls with complete accuracy in a matter of seconds. The higher the production requirements, the more important is this one-point control feature.

For full details on the Durkee system, ask for Pointers, Vol. 2 No. 5. For specifications on the roller mill request Bulletin 153-A.

CW/109

SPROUT-WALDRON
Muncy, Pennsylvania

Size Reduction • Size Classification • Mixing
Bulk Materials Handling • Pelleting

Check 1199 opposite last page.

scoured and heat set, fabrics are dimensionally stable in boiling water and to dry heat up to 250°F. Fiber softens at 300-325°F. Staple form is recommended for use in plate and frame presses.

PVC

Filter fabrics of this material exhibit excellent resistance to acids and alkalis. They perform well in concentrated nitric acid, 66° Be′ sulfuric acid, 50% potassium hydroxide and 36% caustic. Fiber has poor resistance to aromatic solvents although aliphatic solvents do no harm at room temperature. Service conditions are limited to 150°F.

Teflon

Available only in continuous filament form. Because of its high price it has not been used to any great extent. Practically inert to chemical attack. Has low coefficient of friction, fair abrasion resistance, good tenacity and flex strength. It is attacked only at high temperatures and pressures by fluorine and chlorine gases and molten alkali metals. Not recommended for use above 400°F; gives off toxic gases above this temperature.

Polypropylene

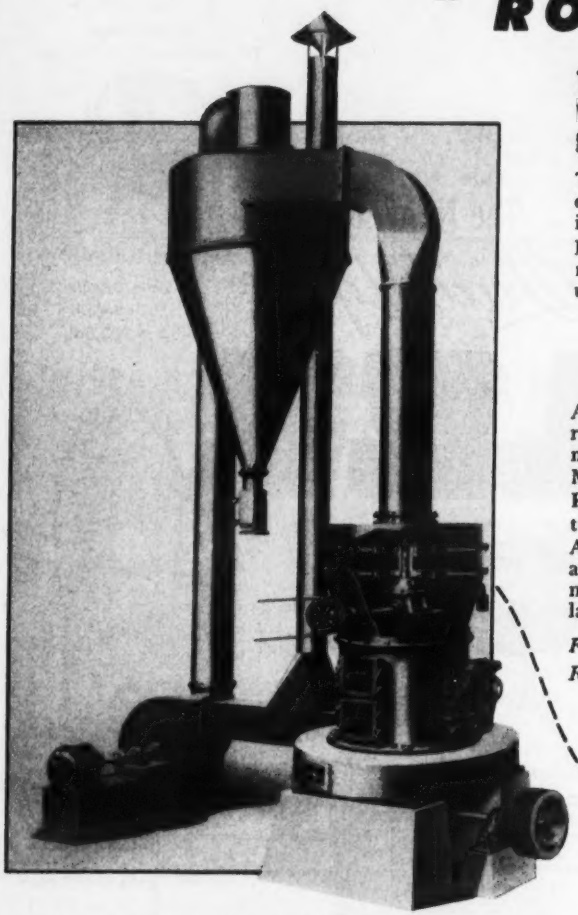
Available in staple, multifilament and monofilament yarn fabrics. Has fine acid and alkali resistance and good resistance to many solvents except aromatic and chlorinated hydrocarbons. Because of its low moisture absorption (less than 0.03%) and "waxy" nature it has excellent cake release properties. Fiber softens at 305-315°F and can be used in most service applications up to 280°F. Because of low moisture absorption, press cloths can be used interchangeably on more than one color dye or pigment with only a light wash between batches. (Additional information about synthetic filter fabrics may be obtained from Technical Fabricators, Inc., 136 Washington Avenue, Nutley, New Jersey.)

Check 1200 opposite last page.

Check 1201 opposite last page.

roll up new production... and profit...records

with *Raymond* ROLLER MILLS



RAYMOND MULTI-PURPOSE ROLLER MILL WITH DOUBLE WHIZZER AIR SEPARATOR

Top performing RAYMOND Multi-Purpose ROLLER MILLS with WHIZZER AIR SEPARATION lead the field in fine grinding in the CHEMICAL and PROCESS INDUSTRIES.

This Mill combines the Raymond High Side Roller Mill and the double Whizzer Separator to afford great versatility and economy in the handling of many fine grinding problems.

Its wide scope of application covers the preparation of powdered materials . . . from simple fillers to fancy chemicals. Typical products pulverized include . . .

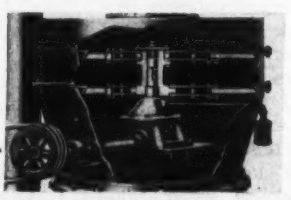
PIGMENTS • FULLERS EARTH • INSECTICIDES • IRON OXIDES • TALC • BARYTES • KAOLIN AND CLAYS • SULPHUR • CARBON MIXTURES • STARCH • LIMESTONE • BAUXITE • CALCIUM SILICATE • MINERAL FILLERS • PHOSPHATE ROCK • GYPSUM.

A single, easy adjustment of the Whizzer controls the fineness range from 20-mesh grades to products essentially all minus 325-mesh.

Mill capacities reach 40 tons per hour and more with a Super Roller Mill. Flash Drying Accessories may be installed when moisture removal is required.

All aspects of Fine Grinding are combined in a clean, dust-free, automatic system that is economical in operation and maintenance. Installations are flexible and readily adaptable to any plant layout.

For detailed information send for the Raymond Roller Mill Catalog Number 79P



Mills are available with Single or Double Whizzer Separators. Whizzers have set of radial blades attached to a disk that revolves on a vertical shaft in separating chamber. Variable speed drive insures finger-tip control of fineness.

COMBUSTION ENGINEERING, INC.
Raymond Division
427 W. RANDOLPH ST.
CHICAGO 6, ILLINOIS
SALES OFFICES IN PRINCIPAL CITIES
Combustion Engineering-Superheater Ltd., Montreal, Canada

Check 1202 opposite last page.

Wrap-around heating adds efficiency to bin-feeder

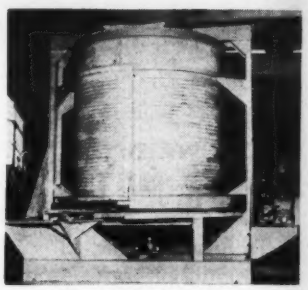
Keeps product at temp needed for best operation

Uses: Feeding wet or sticky materials into processes at controlled temperatures.

Features: Automatic feeder has bin equipped with panel-type jacket that permits wrap-around heating by use of steam or other media.

Description: Panel jacket is stationary, and is mounted 1" from outside of rotating 5½' diam by 6½' high bin. Panel extends approximately three quarters height of bin.

Heating medium circulating through panel's parallel embossed flow channels provides radiant heat to bin's contents. Jacket assembly consists of two semi-circular sections, hinged on one side and clamped together on other. This permits ready disassembly, if necessary.



Feeder's rotating bin is equipped with stationary heating jacket to facilitate temperature control. Photo shows unit without insulation

Panels are made of 14-gage embossed steel, seam welded to 12-gage back sheet. Inlet and outlet connections are provided for each half.

With channel cross-section of 0.31 sq in, and channels closely spaced to provide maximum flow of heating medium, heat transfer is quick, efficient and economical.

The complete feeder assembly consists of the bin mounted on a rotating vertical shaft with spider arms. On same shaft, but mounted below bin, is a circular plate larger in diam than the bin. There is a

gap between plate and bottom of bin. Height of gap can be varied to suit requirements of material being handled.

Two stationary plows each set at correct angle, extend through this gap. As bin, material and plate revolve, plows continuously move product over edge of plate. Feeding rate can be varied by gap setting, distance plows extend into material being fed and speed at which feeder turns.

(Com-Bin Feeders are product of Pulva Corp., 552 High St., Perth Amboy, N. J.)

Check 1203 opposite last page.

(Further information about Panelcoils may be obtained from Dean Products, Inc., 1048 Dean Street, Brooklyn, New York.)

Check 1204 opposite last page.

No coolant needed for mill that grinds thermoplastics

Uses: Pulverizing polyethylene and other thermoplastic powders.

Features: Products as fine as −100 mesh may be produced without use of a coolant.

Description: Mill is equipped with an internal disc-impact device that reduces product by jet, shear and impact. According to manufacturer, wear is slight and has little effect on quality.

Built-in temperature and feed control prevents overloading of grinding chamber. Mill can be adjusted while operating to provide exact desired screen range.

(Further information about mill may be obtained from Pallmann Pulverizers Company, Inc., 315 Newark Street, Hoboken, New Jersey.)

Check 1205 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

CHROMALOX
FIRST NAME IN ELECTRIC HEAT
Precisely controlled Radiant Heaters pre-heat plastic-coated paperforembossing without burning or scorching.
Six long Radiant Heaters form economical, highly efficient oven for curing extruded Teflon tubing.
Radiant heaters in hood cure centrifugally molded glass fiber reinforced torpedo tubes.
Ten radiant heaters automatically controlled for flexible, uniform vacuum forming.

EDWIN L. WIEGAND COMPANY
7500 Thomas Boulevard • Pittsburgh 8, Pa.
CHurchill 2-6400

At the turn of a dial...

CHROMALOX

ELECTRIC RADIANT HEATERS

fast, uniform, economical, safe

Here's high-intensity heat . . . adjustable from 0 to 100% of heating capacity by fingertip control. Different zones of heat intensity can also be set up . . . by arranging heaters in different "banks" with individual controls for each.

Chromalox Far-Infrared (long wave length) is absorbed almost equally fast by all colors, textures and surfaces . . . including clear glass, plastics, cellophane.

For heating, baking, drying, curing, pre-heating, dehydrating, pre-expanding.

Space-saving, non-breakable, all-metal units withstand knocks, bumps, vibration. Moisture-resistant terminals available. No fumes, flames, glare or leaky pipes. Standard heating lengths to 150 inches. Immediate delivery from stock. Low-cost installation and operation. You can build production line heating tunnels, ovens, banks right on the job.

Write for Bulletin G62. Or, for fast action and on-the-job assistance with your heating problem, call your Chromalox Man listed below. 91874

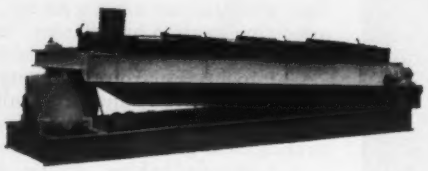
Call Your Chromalox Man for Heating Answers

ALBANY N.Y. Hobart 3-0626
ATLANTA GA. Trinity 5-7244
BALA-CYNWYD PA. Mohawk 4-6113 Greenwood 3-4477
BALTIMORE MD. Hopkins 7-3280
BLOOMFIELD N.J. Edison 8-6900 New York: Worth 4-2990
BOSTON, MASS. Cedar 5-8040
BUFFALO, N.Y. TT-6-4000
CHARLOTTE, N.C. Edison 4-4244 Franklin 5-1044
CHATTANOOGA, TENN. Amherst 5-3862
CHICAGO, ILL. Harrison 7-5464
CINCINNATI, OHIO Trinity 1-0605
CLEARWATER, FLA. Phone 3-7706
CLEVELAND, OHIO Prospect 1-7112
COLUMBUS, OHIO Amherst 7-8260
DALLAS, TEX. Riverside 8-9004
DAVENPORT, IOWA Phone: 6-5233
DENVER, COLO. Glendale 5-3651 Genesee 3-0821
DES MOINES, IOWA Cherry 3-1203
DETROIT, MICH. (See Southfield, Mich.)
HOUSTON, TEX. Capitol 5-0356
INDIANAPOLIS, IND. Melrose 5-5313
KANSAS CITY, MO. Victor 2-3306
LOS ANGELES, CAL. Ludlow 9-6321
MIDDLETOWN CONN. Diamond 6-9606
MILWAUKEE, WIS. Broadway 1-3021
MINNEAPOLIS, MINN. Federal 6-6631
NASHVILLE, TENN. Cypress 2-7016
NEW YORK CITY, N.Y. (See Bloomfield, N.J.)
OMAHA, NEB. 341-7600
PHILADELPHIA, PA. (See Bala-Cynwyd, Pa.)
PITTSBURGH, PA. Emerson 1-2900
PORTLAND, ORE. Capitol 3-4197
RICHMOND, VA. Atlantic 8-8758
ROCHESTER, N.Y. Hamilton 6-2070
ST. LOUIS, MO. Chestnut 1-2433
SAN FRANCISCO, CALIF. Underhill 1-3000
SEATTLE, WASH. Main 4-7297
SOUTHFIELD, MICH. Kenwood 8-2100 Elgin 7-0677
SYRACUSE, N.Y. Granite 4-3933
WICHITA, KAN. Amherst 2-5647

Check 1206 opposite last page.

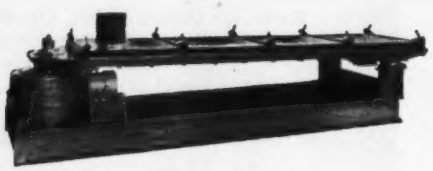
ROTEX®

SCREENERS
and New Rotex COOLERS



ROTEX SCREENERS

- Completely enclosed and dust tight.
- Quiet running, counterbalanced drive.
- Horizontal gyratory motion gives clean, accurate separations and high capacity.
- Heavy welded, steel construction.
- Low head room and fast screen changes.
- ROTEX Ball cleaners prevent screen blinding.
- Over 30 standard models with from 1 to 5 screen surfaces



***NEW* ROTEX COOLERS**

- Completely enclosed and dust tight.
- Well known, quiet running, counterbalanced ROTEX drive.
- Horizontal gyratory rotation keeps material in constant contact with entire cooling surface.
- Heavy, welded, steel construction with stainless steel interiors.
- Accessible interiors with rounded corners and smooth, polished surfaces to meet sanitary standards.
- High cooling efficiency in a low cost, sanitary, easy to clean production cooler.

●

ROTEX Screeners have been widely used for nearly half a century. Now we offer the new ROTEX Cooler. Write for information on your screening or cooling application. Our experienced engineers will be pleased to cooperate with you.

●

ROTEX®

THE ORVILLE SIMPSON COMPANY
1246 Knowlton Street
Cincinnati 23, Ohio

Check 1207 opposite last page.

Sifter's circular and eliptical motion quietly and efficiently processes pulverized pharmaceutical granulations at Sandoz.

Fast, silent and dust-free dual-motion sifter . . .

• Splits pill powder into 3 streams
• Provides precise particle-size control

R. R. SORRENTINO
Supervisor, Tablet Department
Sandoz Pharmaceuticals, East Hanover, N.J.
with **CP STAFF**

Problem: Bulky, out-dated multi-deck screen was difficult to clean and maintain at the East Hanover, N. J., plant of Sandoz Pharmaceuticals, Division of Sandoz, Inc. Installed in the tablet-compounding room, the unit was used to sift various pharmaceutical granulations.

Operation was slow, noisy and dusty. Design was such that it was hard to prevent fine particles from escaping into the surrounding area.

Solution: The old machine was replaced by a compact unit known as a Cirlyptic sifter. Because of its unique combination of circular and eliptical movements, the device achieves high throughput with close control of particle-size separation.

Construction is of easy-to-clean, sanitary, corrosion-resistant stainless steel. Operating speed is 300 rpm, using 1/3-hp motor. There are very few moving parts, which simplifies maintenance.

The sifter has two screens of different mesh sizes mounted in a single horizontal plane. Section underneath screen is partitioned to receive separated fractions. Lead end of sifter has circular motion with a 1½" throw. Other end has eliptical movement with a vertical throw of ½".

This combination of circular and eliptical motions provides granules with maximum angles of approach to screen openings, minimizing tendency to blind

Product is separated by the machine into three fractions: oversize (left), granules for tableting (center), and fines (right)

and assuring peak production.

Sandoz installed a hood just above the unit's feed hopper to trap any dust stirred up during hopper-loading operation. Another dust prevention measure consists of the use of canvas skirts with elastic around their mouths which tightly connect the sifter discharge spouts with fiber drum receivers.

Results: The new sifter quickly and efficiently separates pulverized pharmaceutical granulations into three fractions. Sizes are as follows: Fines (for reprocessing) — through 30 mesh, some down to low micron size; granules (for tableting) — through 14 mesh, held on 30 mesh; oversize (for further crushing) — held on 14 mesh, some particles as large as common gravel.

Particle-size control of separations is excellent — an especially important requirement in the pharmaceutical industry.

The machine performs smoothly and quietly. Dust loss is negligible. Only 15 minutes are needed to remove, wash and replace screens between batches, when different products are scheduled to be sifted. Simplicity of construction coupled with hinged clamps holding cover in place make cleaning task easy.

Except for routine lubrication, the machine requires no maintenance. All grease fittings are conveniently located for ready accessibility.

(Further information about Entoleter model PFMS 3000, series 250, Cirlyptic sifters may be obtained from Entoleter Inc., P.O. Box 904, New Haven, Connecticut.)

Check 1208 opposite last page.

Temperatures up to 1500°F accurately maintained in infrared ovens

Uses: Curing, sintering and heat-treating operations in chemical and allied industries.

Features: Modular muffle oven combines high speed

MIX-MULLER®

MEANS CONTROLLED DISPERSION FOR DRY SOLIDS:

Battery of Mix-Mullers serve high production requirements for mid-west refractories producer.

Intensive mulling can increase output at a savings in raw materials

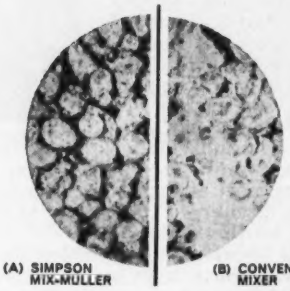
Increase in the usage of the Simpson Mix-Muller has paralleled an enlightened attitude on mixing practice among processors who have learned that careful and *controlled* mixing operations can be an important source of savings in the preparation of dry solids.

In the Simpson Mix-Muller, an intensive kneading, smearing, spatulate action—a mulling action—serves to actually *coat* one material with another. Dispersion of important and expensive components of the mix is rapid, thorough . . . and under your complete control.

If you're caught in the bind between expensive raw materials, increased production demands and boosted quality control standards . . . can you afford to settle for *less* than *controlled dispersion?* Write for details on a confidential **mulling** survey.

See our advertisement in CHEMICAL ENGINEERING CATALOG

Here's why:



(A) SIMPSON MIX-MULLER (B) CONVENTIONAL MIXER

Unmixed smears evident in (B) can cause waste of raw materials, "hot spots," rejects and reprocessing. These unmixed areas make quality control difficult and can nullify any mixer manufacturer's claim for fast mixing.

SIMPSON MIX-MULLER® DIVISION

National Engineering Company

640 Machinery Hall Bldg. • Chicago, Illinois

WRITE FOR HANDBOOK

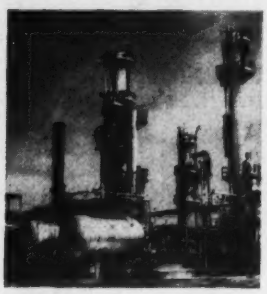
Handbook on Mulling describes controlled dispersion in simple terms, provides full details on nine models of the Simpson Mix-Muller; how it is used; how it can benefit you.

Check 1209 opposite last page.

SARCO TOPICS

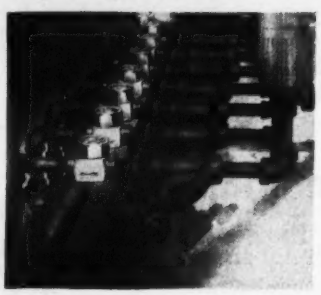
HOW TO SOLVE COMMON TRACER LINE PROBLEMS

How to cure water hammer with a steam trap that will operate in vertical position



Water hammer is an inherent problem in long tracer lines. So is freezing. Both problems can be overcome, and here's an example of how it has been done. At the Socony Mobil Oil Company's Paulsboro, N. J., refinery, they found that the Sarco Thermo-Dynamic Steam Trap, type TD-50, not only withstands water hammer, but installing the trap in a vertical position —which permits free drainage—presents no problems at all, thanks to its unique thermodynamic principle. In fact, 90% of the 250 TD-50's at this plant are vertically mounted. They never block heat transfer, and they remove condensate and air as fast as they collect.

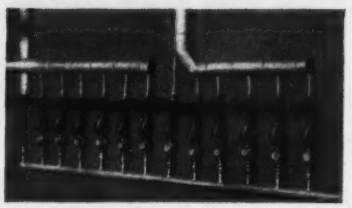
How to handle varied steam pressures — without adjustment



Can a trap — without adjustment — handle steam pressures that vary from 15 to 160 psi? Can the *same* trap vent air and drain condensate as rapidly as it is formed, be easy to install and require practically no maintenance at all? That was the problem set up by the engineering staff of Armour Chemical Division's McCook plant. They solved it by testing many traps. Their conclusion: Sarco TD-50 steam traps meet or beat their specifications, because:
they discharged condensate as fast as it formed, without wasting steam;
their compact inline construction made installation easy, even in tight quarters;
maintenance was practically negligible;
no adjustment was necessary for varying steam pressures. (In fact, the TD-50 is self-adjusting through its full operating range of 10-600 psi.)

No other steam trap can so adequately solve all these problems at one time.

How to be certain process fluid stays above 280° F. when outside temperature drops to —10° F.



The problem of maintaining design temperatures on tracer lines need not be difficult, no matter how extreme the conditions seem to be. For example, the tracer lines in a phthalic anhydride process at Witco Chemical Company's new Chicago plant had to be maintained above 280° F. Below this temperature, the chemical sets and the whole system would have to be taken apart and re-assembled. That's not all; ambient temperatures sometimes could drop to —10° F.

With reliability as a prime consideration, Scientific Design Company, Inc., who designed and constructed this brand new plant, selected the TD-50.

Because the TD-50 can be mounted vertically, freezing was no problem either. Added benefits that matter on tracer lines: the TD-50 is compact, light in weight, easy to install.

What is the most reliable tracer line trapping method to prevent unscheduled shutdown?

Particularly in refineries, steam traps have to function under exactly the kind of conditions that you'd expect to cause failure—they must function equally satisfactorily on low pressure or exhaust steam and on up through high-pressure, high temperature ranges. Not only that, but outside temperature may vary from subzero to subtropical. If maintaining design temperatures in your tracer lines appears to be hampered by these problems, consider how Phillips Petroleum Company, Kansas City, solved them. They found a trap which drains their tracer lines automatically over a full range of pressure, temperatures and loads. It's the Sarco TD-50 Steam Trap.

With only one moving part—a stainless steel disc, the TD-50 has little that can go wrong. In fact, it's so free of trouble that Phillips Petroleum Company consider their TD-50's as reliable and efficient as the piping. They now rely on 1800 of them throughout the plant. 1408

FOR FULL INFORMATION ON TRACER LINE TRAPPING or on any steam trapping problem—see your Sarco Sales Representative or write to

SARCO

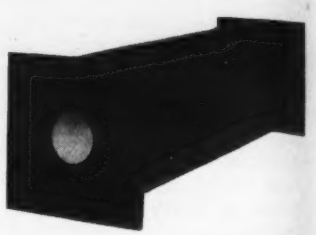
SARCO COMPANY, INC.
475 MADISON AVENUE, NEW YORK 22, N. Y.
PLANT: BETHLEHEM, PA.
STEAM TRAPS • TEMPERATURE CONTROLLERS
STRAINERS • HEATING SPECIALTIES

Check 1210 opposite last page.

heating with close temperature control. Interior temperatures as high as 1500°F can be maintained.

Description: Oven utilizes advantages of infrared heating to fullest extent by focusing all heat directly on work as it passes through inner cylinder, which is a high-emissivity surface generating infrared radiation. Resistance wire elements are used to bring surface up to proper temperature.

Muffle ovens are both structural and modular. Sections



Infrared muffle ovens are designed for tough service

may be bolted together to provide necessary length for specific applications. Inner cylinder diameters range in sizes from 2 to 20″, in increments of 2″. Muffles larger than 20″ in width can be made by joining together a number of rectangular-design panels which are also available.

(Further information about modular muffle ovens may be obtained from Infrared Systems, Inc., Riverdale, N. J.)

Check 1211 opposite last page.

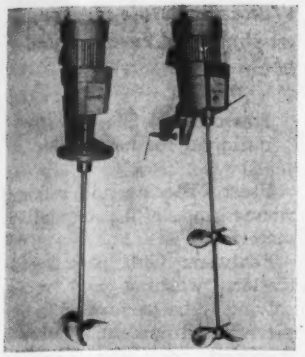
No lubrication needed for five years on mixers

Uses: Fluid agitation in chemical, food and allied industries.

Features: Mixers require no lubrication or adjustment under normal operating conditions for five years.

Description: New line of mixers are designed for improved mixing efficiency, handling convenience and maintenance-free operation. Units are available in either fixed-mounting or portable designs.

Positive-drive chuck, per-



New line of mixers are available in fixed-mounting (left) or portable (right) designs

mits fast, accurate coupling in one operation. Its location is always above maximum fluid level of mixing tank. Standard single or dual propellers are available.

Mixers with direct-drive have speeds up to 1750 rpm. Gear-drive model speeds are 350. Motors are ball bearing, totally-enclosed or explosion proof, in sizes ranging from ⅛ to 3 hp (fixed-mounting design does not have ⅛ hp size).

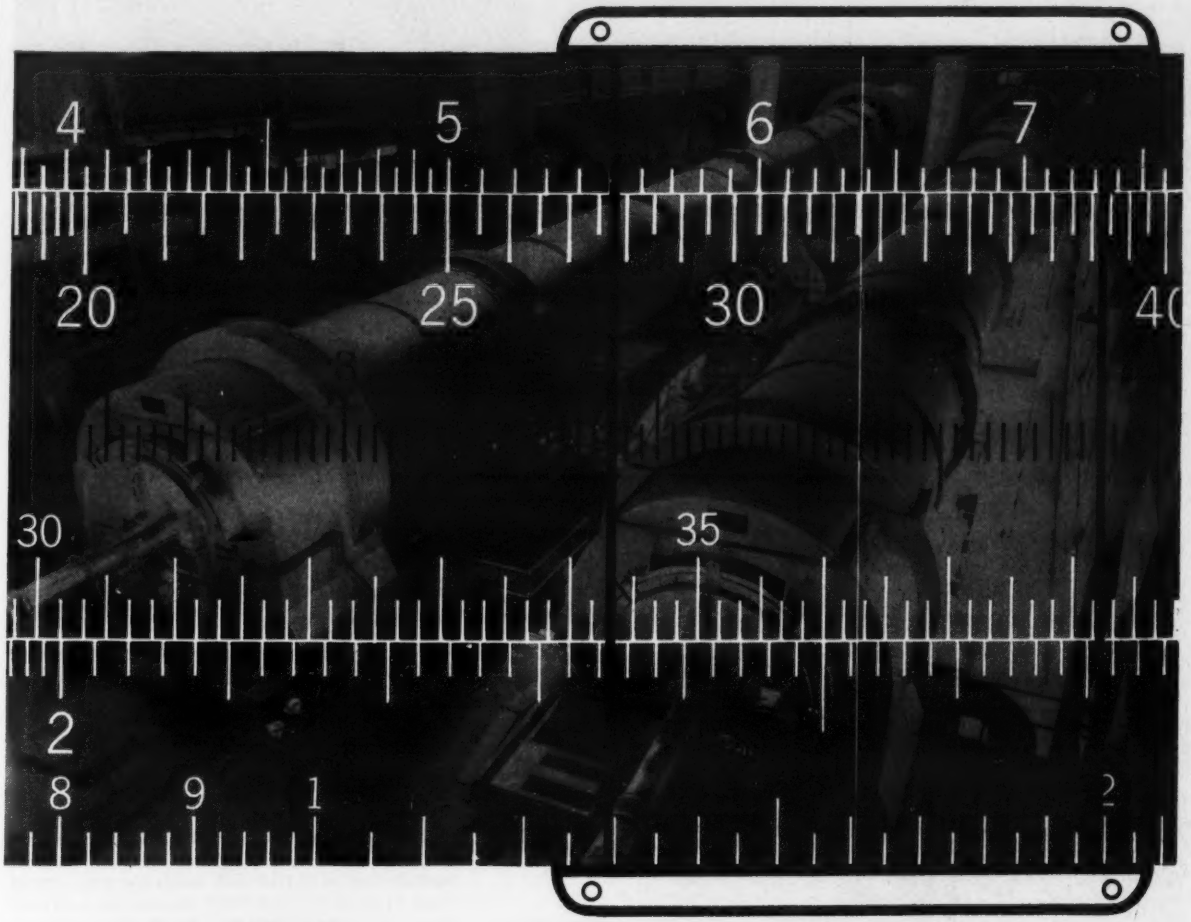
(Further information about Lightnin mixers may be obtained from Mixing Equipment Co., Inc., 170 Mt. Read Blvd., P. O. Box 1370, Rochester 3, New York.)

Check 1212 opposite last page.

"Just answer the question and stop calling me 'Master'!"

TRAYLOR PRECISION

from design through installation to operation



TKA-7

Shown above are two* 11'-3" x 300' dry process Traylor kilns designed to meet the specific needs of the Lone Star Cement Plant in Nazareth, Pennsylvania. These modern rotary kilns feature full-floating type roller ring and roller supports which insure easy alignment, continuous operation and low maintenance costs. Traylor rotary kilns have all welded steel shells, feed and discharge end seals and improved kiln feed.

Write today outlining your kiln requirements and let our engineers make recommendations . . . or write for Bulletin No. 1115.

*Shown in the background are two additional Traylor Kilns, 11'-3" x 270'.

TRAYLOR ENGINEERING & MANUFACTURING
DIVISION OF FULLER COMPANY

1552 MILL ST., ALLENTOWN, PA.

Sales Offices: New York, Chicago, San Francisco
Canadian Mfr.: Canadian Vickers, Ltd., Montreal, P. Q.

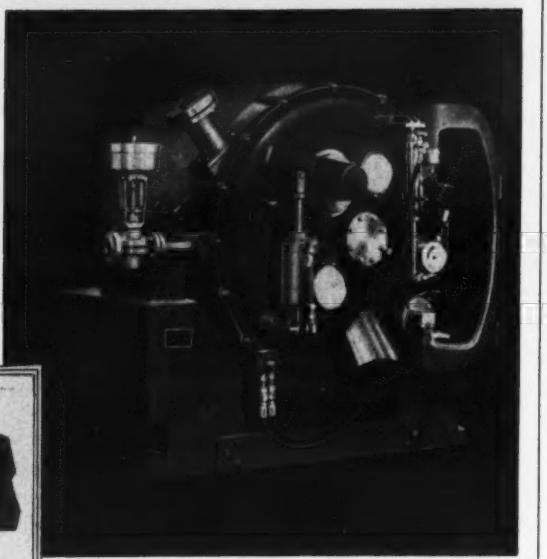
Check 1213 opposite last page.

the unbeatable combination—

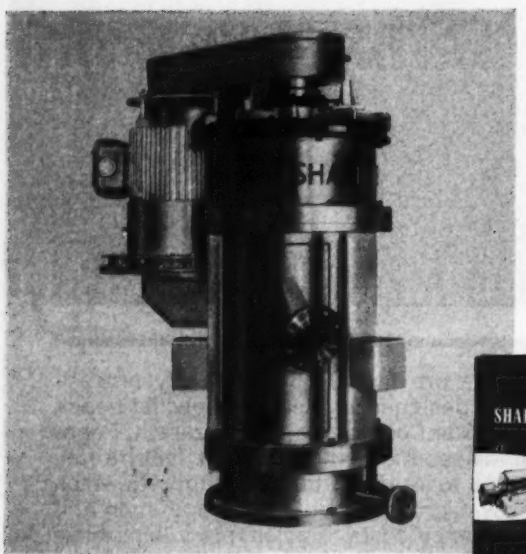
FOR PRESSURE OPERATION . . .

SUCCESS STORY:
The Super-D-Hydrator and deliquefication of the Polyolefins

Over the past year, more than a dozen Sharples C-41 and C-27 Super-D-Hydrators have been operating day in and day out on production lines where extreme high purity, dryness of solids, and high capacity are essential . . . where crystals and fine compressible solids such as the polyolefins are deliquefied, multiple-washed, and dried in pressurized systems. This outstanding record speaks for itself as orders come in for additional machines, and new programs specify "Super-D-Hydrators" down the line.

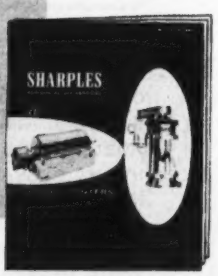


Request Sharples Bulletin 1286



ADVANCE PERFORMANCE:
The P-4000 Super-D-Canter Leads New Process Development.

For sealed operation at up to 150 psig pressure, or under vacuum, the Sharples exclusive vertical Super-D-Canter will continuously handle a wide range of particle sizes in slurries with solids concentration of from ½ to 50%. This truly pressurized centrifuge fills a need which already is being reflected in the new more profitable processes which are supplanting many more conventional approaches. It will pay you to know the facts of the P-4000 Super-D-Canter.



Request Sharples Bulletin 1287

The Super-D-Hydrator and P-4000 Super-D-Canter . . . Sharples Exclusives.

THE SHARPLES CORPORATION

Centrifugal and Process Engineers

2300 WESTMORELAND STREET / PHILADELPHIA 40, PENNSYLVANIA

NEW YORK • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO • HOUSTON • SAN FRANCISCO • LOS ANGELES • ST. LOUIS • ATLANTA

Associated Companies and Representatives throughout the World

Check 1214 opposite last page.

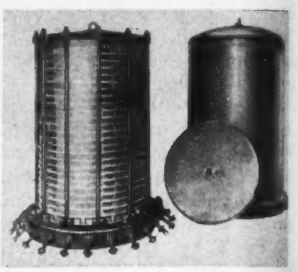
Waxes, crystals filtered, washed and re-dissolved in single unit

Pressure-leaf filter is designed for long cycles

Uses: Filtering and refining waxes and other crystalline materials.

Features: Unit permits filtration, washing and redissolving to be performed in one piece of equipment. Device is designed for long filtration cycles.

Description: Filter is a multiple, horizontal plate, pressure-type unit. Plates are made of cast aluminum and have pyramid drainage surface. Plates are covered with perforated sheet and filtered paper.



Filter has large cake-holding capacity, can operate for months without cleaning

Drainage ports are located in the hand holes staggered at six points along periphery of each plate. Filter is fed through center opening.

Entire stack of plates is tied down at base by 12 stainless steel tie rods. These slide into sockets at bottom and brackets at top.

Filter's cover is removed by disengaging swing bolts located at bottom of unit. Tie rods can then be loosened, permitting plates to be raised by grapple hook.

Because of unit's large cake-holding capacity, some filters in actual operation are functioning for as long as a week to three months, without downtime. Shell may be fabricated of any suitable corrosion-resistant alloy. Plates can be made of aluminum or other alloys, rubber, glass-reinforced polyester or plastic.

Filter media may be textile

or wire cloth, paper or in combinations. Chamber space for cake can be made to any depth practical to meet requirements of product being handled.

(Further information about horizontal-plate pressure filter may be obtained from T. Shriver & Co., Inc., 800 Hamilton St., Harrison, N. J.)

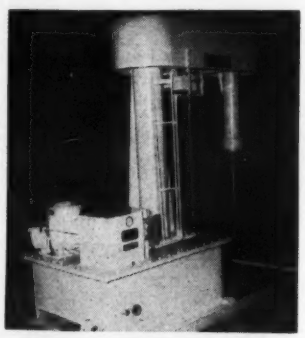
Check 1215 opposite last page.

Hydraulic mixer practically runs by itself

Uses: Mixing emulsions and pastes in chemical and allied industries.

Features: Thick, heavy paste can be mixed in conventional drums within 10 to 15 minutes. Machines are fully automated.

Description: Hydraulic-driven unit is equipped with controls that relieve operator from constant watching of



A drum of thick, heavy paste can be mixed in 10 to 15 minutes with this automatic unit

mixing cycle. Mixer's turbine-impeller moves up and down automatically during mixing cycle, assuring uniform consistency.

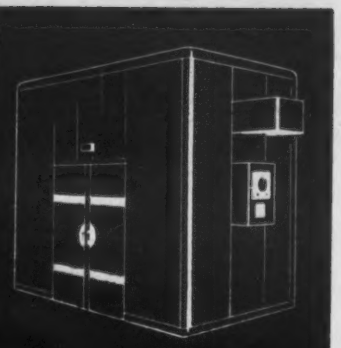
Timing devices regulate various sequences of turbine rotation from 0 to 700 rpm. Limit switches control minimum and maximum height of mixing level between 0 to 42".

(Further information about automated hydraulic mixers may be obtained from The Stevenson Company, Wellsville, Ohio.)

Check 1216 opposite last page.

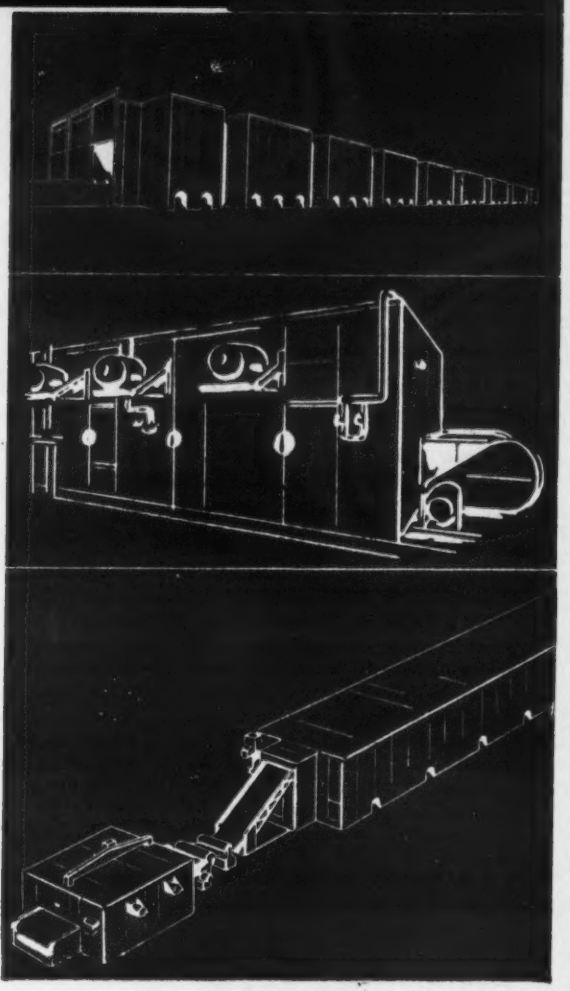
WHERE "NATIONAL" DRYING EQUIPMENT IS USED

Production Up, Cost Down!



No matter what your product may be, it can be dried or otherwise processed at a lower cost per pound or other unit, in one or more of the various types of "NATIONAL" equipment.

High-speed production; maximum effective use of the drying medium under finely adjusted control; adaptability to existing plant conditions and future expansion; and the assurance of long, trouble-free operation are among the important reasons why "NATIONAL" machines are being erected in more and more chemical plants throughout the United States and in other countries.



"P-4" CONSTRUCTION. The result of a radically new approach to simplified Dryer construction, "P-4" Construction provides a precision-built, prefabricated structure, with trussed-and-tensioned insulated panels. It assures a more rigid, durable machine, with installation time in your plant reduced as much as 50%.

"ADD-A-UNIT" DESIGN. This unique accomplishment of "NATIONAL" engineering provides alternatives which are both practical and economical—(1) simplification of the initial installation based on present requirements; (2) maximum adaptability to step-by-step future expansion.

OTHER SPECIAL FEATURES. Patented Super-Power Fans, made in our own shops to specifications developed through years of industrial drying experience. Patented Indexing Orifices, Turning Vanes and other devices and arrangements assure unequalled versatility and precision in air distribution and control. The heat source may be steam, gas, oil or other medium.

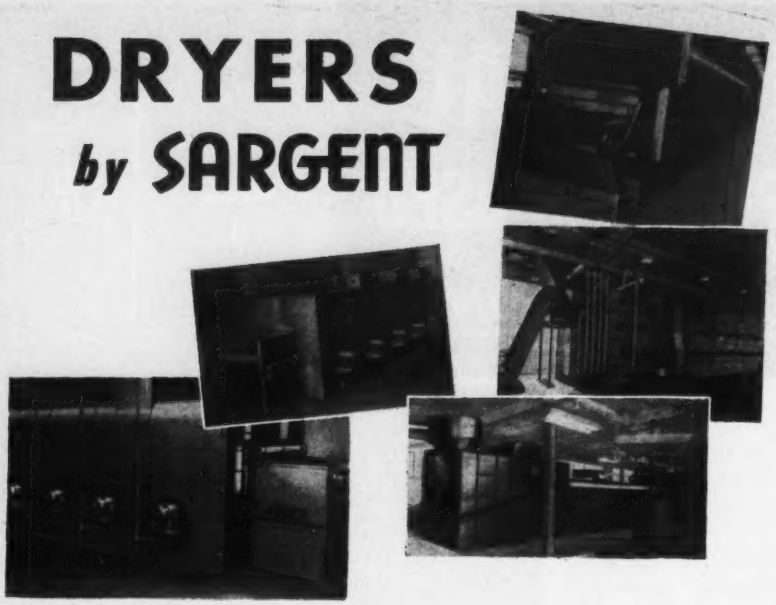
THE NATIONAL DRYING MACHINERY COMPANY

LEHIGH AVE. and HANCOCK ST., PHILADELPHIA 33, PA.

New England Agent: JONES & HUNT, INC., Gloucester, Mass.
Southern Agent: HAYES TEXTILES, INC., Spartanburg, S. C.
Cable Address: "NADRYMA"—W.U. Code

Check 1217 opposite last page.

DRYERS by SARGENT



The Most Sensible Way To Dry Solids and Semi-Solids

Single pass or multi-pass, single stage or multi-stage, a SARGENT perforated flight conveyor dryer will prove for you, as it has for many others throughout the chemical process industries, the best investment for continuous production of uniformly dried, top quality material at unprecedented economy.

With a SARGENT Dryer, dusting is reduced to a minimum . . . in many materials it is eliminated. There is little or no particle attrition. Material will not case harden. For semi-solids, a SARGENT Extruder with oscillating feed distributes over the conveyor an even, porous bed of material in pellet, rod or other form. Economy with a SARGENT starts with installation . . . SARGENT'S unique method of precision pre-assembly guarantees the fastest, easiest installation of any dryer on the market. Labor and downtime for maintenance and cleanout are reduced to a minimum because of SARGENT'S exclusive design of quick and easy access to all sections. Every Sargent Dryer carries a firm performance guarantee.

We'd like to show you how a SARGENT can help you to better processing. Our modern research laboratory is fully equipped to help you with your drying problems. Just write us.

CONVEYOR DRYERS • TRAY DRYERS • TRUCK, TUNNEL, AND POLE DRYERS • LAB DRYERS • COOLERS • FEEDERS, WEIGHING, VIBRATING SCREEN, OSCILLATING FEED • EXTRUDERS, SINCLE AND DOUBLE HOPPER • GRANULATORS • MIXERS SPECIAL PURPOSE MACHINERY

C. G. SARGENT'S SONS CORPORATION

Graniteville, SINCE 1852 Massachusetts

PHILADELPHIA • CINCINNATI • ATLANTA • CHARLOTTE • HOUSTON • CHICAGO • DETROIT • TORONTO

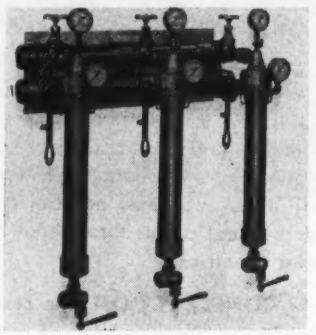
Check 1218 opposite last page.

Only one minute needed to change quick-coupling, fluid filters

Uses: Filtering hot or cold chemicals, oils or water.

Features: Units can be backwashed and blown down "on the run". All are quick-coupling, require no tools to disconnect. Elements can be changed in a minute.

Description: Single-element filters are designed for wall mounting and are available in capacities ranging from five to 350 gpm. Larger throughputs can be obtained by connecting several units in parallel.



Wall-mounted group of filters can handle 225 gpm

Filter elements are made of metal-mesh cloth or perforated sheet. They withstand up to 200 psi, 450°F. Various materials of construction are available in 10 to 700 mesh. Largest single unit measures 3¼ x 36" long, has 364 sq inch filter area, fits 2" line.

(Further information about wall-mounted, fluid filters can be obtained from Ronningen-Petter Co., 6870 East YZ Avenue, Vicksburg, Mich.)

Check 1219 opposite last page.

NEXT MONTH

Installation of new equipment does not always meet with the overwhelming enthusiasm of the men who will be called upon to operate it. For the story on an exception to this see the article on Cook Paint & Varnish's use of mixers and mills in December CP.

Highly Intimate Blends in 1 to 2 Minutes

Blends while discharging; No segregation or flotation

Sturtevant Rotary Blenders start 4-way blending while charging, continue it during discharge, thus producing highly intimate, even blends of dry and semi-dry materials – within 3 to 5 minutes of start of charging.

Six *complete* blending cycles per hour are common. And Sturtevant's special action produces no particle reduction, cleavage or attritional heat – is highly effective yet gentle and safe even with explosives.

Receiving

Scoops cascade material as drum rotates. Movement forces material from both ends to middle. Thus blending is 4-way right from start of charging.

Discharging

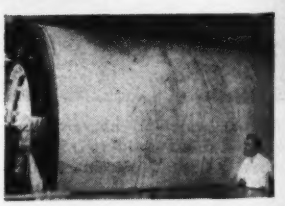
Single gate controls charge, discharge. Blending continues throughout discharge phase. Result is no segregation or flotation — highly intimate, even blends.

Self-cleaning, dust-sealed drum; one-man accessibility

Operation of Sturtevant Blenders is self-cleaning – drum interiors are completely dust-sealed. For inspection of all models, one man simply loosens a few lugs to remove manhole cover – quickly and easily.

Nine standard models with capacities to 900 cu. ft.

10 cu. ft. Sturtevant Blender at U.S. Steel Corp.'s new Applied Research Laboratory (Raw Materials Division) in Monroeville, Pa. This unit handles batches up to 500 lbs. — is ideal for pilot work and small runs.



One of four 450 cu. ft. Sturtevant Blenders at Celriver Plant of Celanese Corp. (Rock Hill, N. C.). These large units handle up to 20,000 lbs. batches — have a 9-year record of meeting the most exacting blending requirements.

Fully or semi-automatic, or manually controlled operation

Constructed of carbon steel, stainless steel or Monel metal, Sturtevant Rotary Blenders are engineered to fit each customer's needs – can be supplied with injector sprays and any desired control system.

For more on Sturtevant Blenders, request Bulletin No. 080B. (Bulletins also available on Mixers, Air Separators, Micronizers, Crushers and Grinders.) Write today. STURTEVANT MILL CO., 119 Clayton St., Boston, Mass.

Check 1220 opposite last page.

NEW LITERATURE
Processing Equipment

Advantages of vacuum refrigeration are explained in eight-page catalog. Applications of units not requiring any chemical refrigerants or absorption solutions are shown. Chill-Vactor Cat—Croll-Reynolds Co.

Check 1221 opposite last page.

Revised handbook of crushing has been published. The 40-page book covers entire subject of mechanical size reduction. Impact, attrition, shear and pressure methods are reviewed. Book is amply illustrated with diagrams and charts. "A Handbook of Crushing"—Pennsylvania Crusher Division, Bath Iron Works Corporation.

Check 1222 opposite last page.

Sifting and screening equipment is featured in two-page data sheet. Various sizes from 15 x 15" riddles to triple-deck units are shown. Prices are also listed. Bul "Sifting and Screening Equipment"—Speedex Equipment Co.

Check 1223 opposite last page.

Continuous pressure cooker-extruder is topic of two-page specification sheet. Operation, features and maintenance of unit are discussed. Machine is primarily designed to cook or gelatinize starches and cereal grains. Spec Sheet 224—Sprout, Waldron & Co., Inc.

Check 1224 opposite last page.

Liquid-solid separation equipment, including filtration, flotation and clarification units, are discussed in four-page catalog. Brief descriptions and photographs are included. Cat FP-1003—The Eimco Corporation.

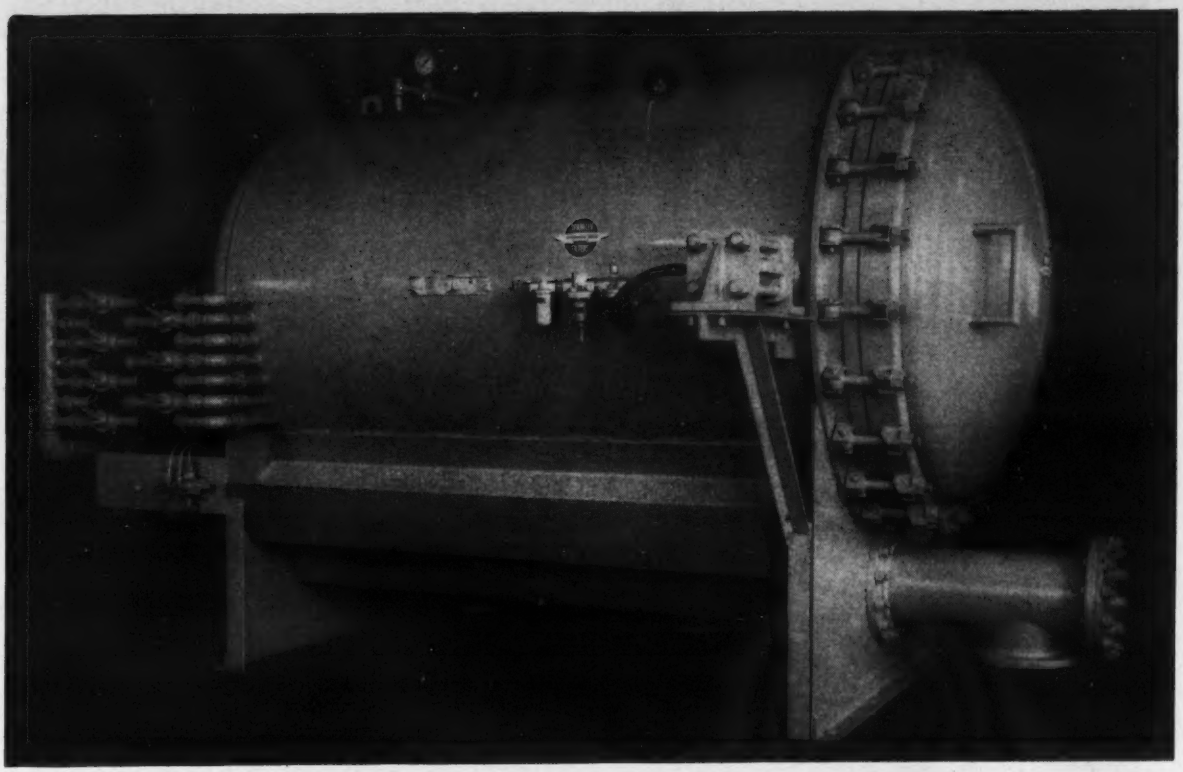
Check 1225 opposite last page.

"Magnetic ideas" is topic of 48-page booklet covering permanent, non-electric, magnetic separation equipment. Units are capable of removing tramp iron from all kinds of wet or dry processing lines. Photographs illustrate installations of magnetic pulleys, grate magnets, plate magnets and other devices. Bul "Magnetic Ideas" — Eriez Manufacturing Company.

Check 1226 opposite last page.

How crusher produces large tonnages of extremely fine products is unfolded in four-page bulletin. Unique feed arrangement and other engineering features are shown in cross section drawing. Bul "Gyradisc Crusher"—Nordberg Mfg. Co.

Check 1227 opposite last page.



A NEW AUTOMATIC FILTER

Has horizontal plate cake stability plus automatic cake discharge

SPARKLER Model HRC

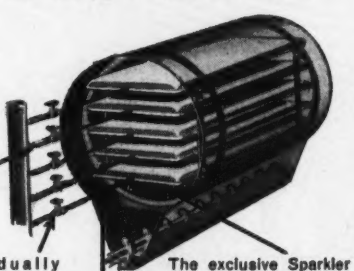
Filters with plates in horizontal position thus assuring complete cake stability, no danger of cake cracking or breakthrough under any operating condition or even with complete shut down.

To clean; cake is blown dry. Each plate operating with individually valved outlets and sight glass. Then plates are rotated to vertical position and the cake drops off with the aid of a vibrator and is expelled by a worm screw in the bottom of the tank in semi dry state or can be furnished without screw for liquid slurry discharge. The complete cleaning operation is performed without opening the filter, a completely enclosed system.

All operations of the filter including precoating and cleaning can be fully automated.

Write for complete information

Diagram of operating position of plates during precoating, filtering, and blow down. Horizontal position assures positive cake stability.



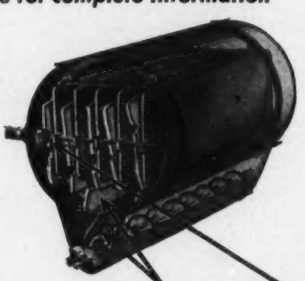
Sight glass for each plate is provided on outlet to give a continuous check on clarity during filtering and to determine when cake is dry during blow down.

Individually valved outlet for each plate.

The exclusive Sparkler plate construction gives unrestricted flow through the filter plate. Uniform, full support of the filter media eliminates mechanical breakage.

Flexible non-corrodible tube connecting each plate with individual outlet. Flexibility of this connection permits rotating of the plate assembly for cleaning.

Diagram of operating position of plates during cleaning, with plates rotated to a vertical position.



Dry cake falls off vertical position of plates and drops into trough bottom to be expelled with screw conveyor.

Vibrator rod connects through tank wall with linkage on plates to drop cake.

SPARKLER FILTERS

SPARKLER MANUFACTURING COMPANY · Conroe, Texas, U.S.A.

Check 1228 opposite last page.

. . . another exclusive Development from FALLS FI INDUSTRIES . . the almost perfect frangible . . .

Impervite

IMPERVIOUS GRAPHITE

RUPTURE DISK

. . . is the most reliable, most economical method of protecting your pressured systems. Disks can be selected *easily* because the same disk can be used in practically any service, and studies indicate no change in burst characteristics due to fatigue. Replacement schedules and complicated inventory can be eliminated.

This disk is only one example of the outstanding processing equipment developments of Falls Industries. Use coupon at left for detailed bulletin on the IMPERVITE Rupture Disk, or other impervious graphite equipment.

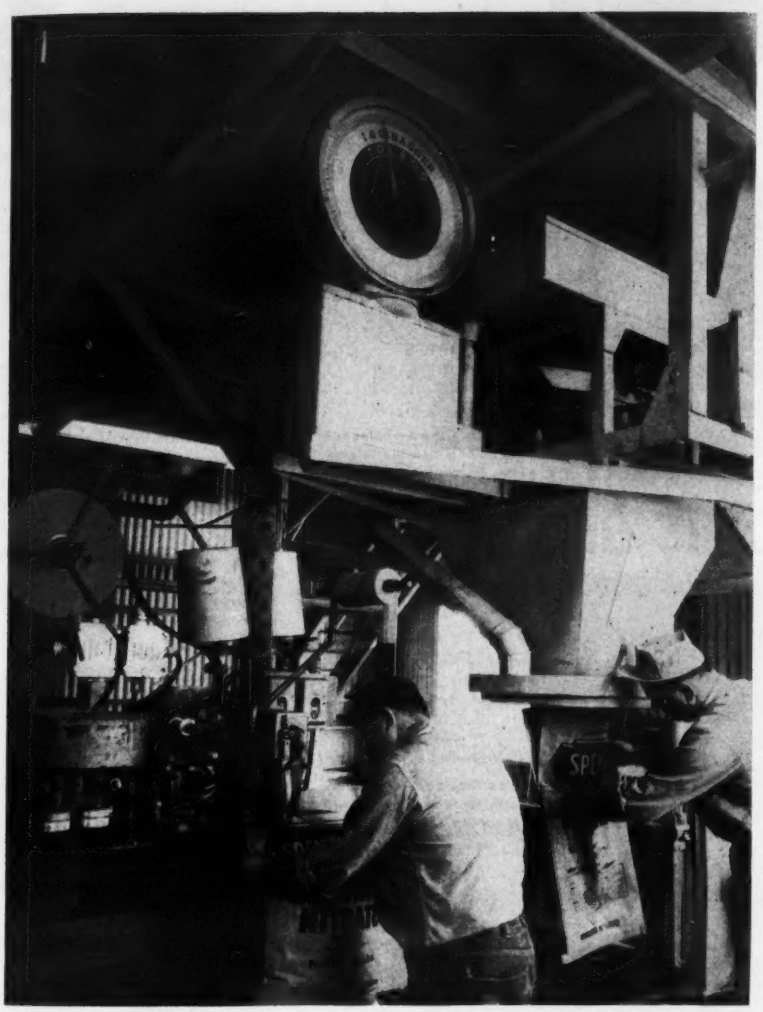
Accurate to ±5% of rated burst, even at low pressures — almost universally corrosion resistant — different operating temperatures will not affect burst — mounts in standard ASA Flanges — non-contaminating, non-porous, immune to thermal shock — recommended at 75% of rated vessel burst — 100% clean rupture for maximum venting — *and* studies to date indicate no fatigue failure.

IMPERVITE Rupture Disks are available in diameters to 24" at burst pressures to above 250 psi, for almost any temperature. Each disk is supplied in separate, well-marked box.

SEE OUR CATALOGING IN C E C

FALLS FI INDUSTRIES, INC.
SOLON, OHIO
TELEPHONE: CHurchill 8-4343 TWX: SOLON O -720

For more information on product at left, specify 1229 see information request blank opposite last page.



Bagger (right) is fed by conveyor from main hopper in adjacent building. Charge to filler is indicated on scale face. Operation is automatic from time bag is placed on spout; conveyor carries filled bag to stitcher at left

Shift from manual to automatic weighing and filling cuts costs $5000/yr; improves filling accuracy; and nearly quadruples packaging potential as . . .

Bagger booms NH_4NO_3 output

PETER W. GIDDINGS, Superintendent
Ammonium Nitrate Section
Jayhawk Works, Spencer Chemical Company

Problem: There were two drawbacks to the manual packaging method used by Spencer Chemical Company's Jayhawk Works at Military, Kansas, for bagging ammonium nitrate.

Consisting of two manual packers, each operated by one man, and a stitcher, manned by a third employee, the system was time-consuming in that accuracy of the load depended upon the amount of time the weigher spent portioning out material.

If he took too much time weighing the ammonium nitrate, the total bagging rate — at best 350 bags/hr — declined.

With this method, the empty bag was held on a filling spout by a toggle-locking clamp and was suspended from the filling scale.

The operator controlled flow of ammonium nitrate into bag by opening and closing a clamshell valve. The desired weight was obtained by manipulating the clam shell to reduce the flow to a dribble as the correct weight was approached.

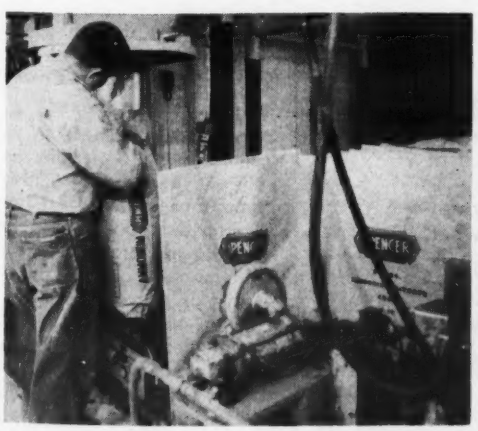
While ammonium nitrate is relatively inexpensive, overloading could quickly mount up to a substantial sum of money with the quantities handled at the Jayhawk Works. Underloading, of course, could injure customer relations.

Solution: A high-speed automatic packer was installed, replacing the two manual packers.

Ammonium nitrate is carried by conveyor belt from the processing area in another building to an overhead hopper which serves the packer.

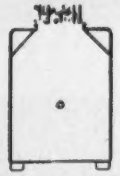
Weighed automatically in 50-, 80-, or 100-lb units in the overhead hopper, the ammonium nitrate is dropped through the spout into the open-mouth multiwall bag held by the machine operator.

An electronic timer holds the hopper gates open for a pre-set interval, geared to the desired quantity. The machine cycles automatically so the operator is free to reach for

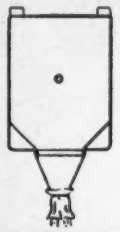


Bag handler (foreground), adapted by Spencer engineers for this operation, utilizes vacuum pick-up system to select and position bags for bagger

Mr. Giddings, the author, shows one of the multiwall open-mouth bags in which ammonium nitrate is packaged. Conveyor which carries sealed bags to shipping can be seen at extreme right



Fills Fast—22" opening permits fast filling of powdered materials. Internal cone conforms to angle of repose of product.



Empties Clean—Internal cone funnels all materials out of bin. No residue remaining.

Waste of labor and product is obsolete...

Stores Outdoors—Weatherproof, turns yard area into warehouse. Stacks 2 high.

Cuts Shipping Costs—low cost flat-bed equipment considered part of special rail car with "freight free" advantages.

* Lic. under pat. #2862645

Waste of labor, product, floor space, time is now outmoded—eliminate it in your plant today.

Powell's new Invert-a-bin* Semi-Bulk Handling System has put an end to the biggest headache in handling granular products. These sturdy, easy-to-handle steel or aluminum containers are easy to fill and easy to empty. Weatherproof, they can be stored outdoors freeing indoor storage areas for production.

Ideal for inter-plant or intra-plant these units are considered part of special rail car with "freight free" advantages. Due to the simplicity of design, maintenance of the Invert-a-bin* is nil.

Why continue losing time and money with old style disposable packages when this remarkable new Invert-a-bin* is immediately available on either lease or purchase. Write for literature today!

THE POWELL PRESSED STEEL COMPANY

250 ERIE STREET HUBBARD, OHIO

Check 1230 opposite last page.

another bag.

Since this speed can be adjusted, production rate is limited only by the speed with which the operator can feed bags to the spout.

At the end of the interval, the timer energizes solenoid air valves, which simultaneously close the gates, open the cut-off gate to full open position, and start the feeder motor, beginning another filling cycle.

The filled bag is delivered by conveyor to the sewing machine where it is sewn and taped. Sealed bags are then sent via conveyor belt to the loading dock for shipment.

Results: Packaging rates have zoomed from 350 to 600 bags per hour — the present operating level — although the automatic packer could deliver as many as 1200 bags/hr.

Only one man is required to operate the automatic packer, freeing for other duties the second bagger formerly required. Labor costs have been cut $5000/yr.

The present set-up allows an accuracy of ± 2 oz in filling 50-, 80-, or 100-lb bags, thus eliminating the problem of overloading or underloading.

(I & C Bagger Model UB 101B-S2-T was specially manufactured for Spencer by Union Bag-Camp Paper Corporation, 233 Broadway, New York 7, N.Y.)

Check 1231 opposite last page.

Switch responds to flow stoppages, activates corrective measures

Flow switch is designed to respond to the lack of material at a critical point in a bulk material-handling system and automatically correct the difficulty or sound an alarm.

Flow of material past the switch deflects the flap and holds it out of operating position. When there is no material to deflect the flap it swings back into operating position actuating the switch. This, for example, could start an elec-

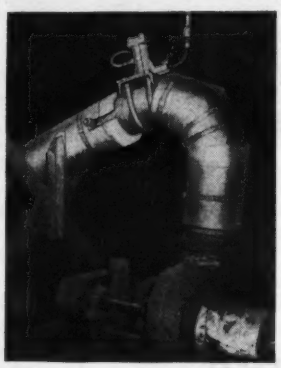
tromagnetic bin vibrator to break down arching or plugging in a bin, or sound an alarm.

Switches can be installed in all types of feeder and conveyor troughs, in discharge openings of bins, bunkers and hoppers; in angled or vertical connecting chutes; and in the discharge chutes of dryers, crushers, ball mills and other processing equipment.

The shaft to which the flap is attached is mounted in ball bearing pillow blocks. Actuating angle of the flap as it affects the switch is adjustable through 360°.

(Model FS-1 flow switch is product of Syntron Company, 110 Lexington Avenue, Homer City, Pa.)

Check 1232 opposite last page.



Plugging eliminated . . .

. . . with pneumatic impacting vibrator for moving wet, moist material through all types of piping arrangements. Powdered coal, carbon black, ores and fly ash are dislodged not "packed" by timed piston impact of vibrator. Unit is supplied with special mounting bracket and U-bolts for mounting on 4", 6" or 8" standard pipe.

Vibrators can be used in hazardous atmosphere, under extreme moisture conditions, on outside applications or where magnetic dusts exist.

(NAVCO BH-2 Air Vibrators are development of National Air Vibrator Company, 435 Literary Avenue, Cleveland 13, Ohio.)

Check 1233 opp. last page.

Most accurate of all mechanical variable speed drives:

positive P

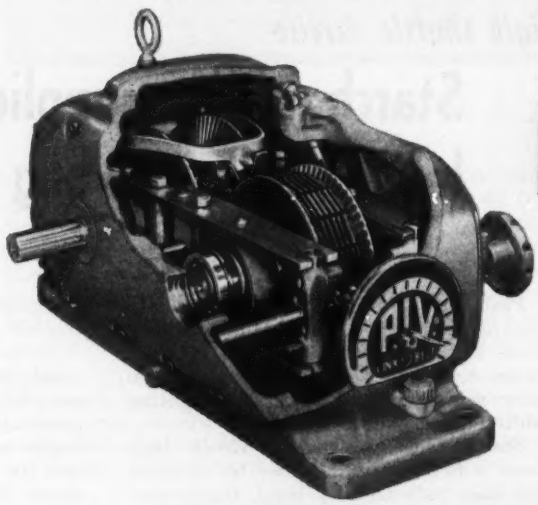
Infinitely Variable

For stepless, slipless speed changing, there's nothing like Link-Belt P.I.V.—the *only* chain-driven variable speed drive.

With P.I.V., teeth—not tension—assure positive, high-efficiency power transmission. You can select any speed in its range—find it instantly, hold it indefinitely. The exclusive all-metal, self-tooth-forming chain meshes with radially grooved wheels . . . maintains positive, nonslip contact at any speed under all loads.

P.I.V. drives are fully enclosed . . . unaffected by atmospheric conditions. They're available in 8 sizes, 16 standard types, capacities from ½ to 25 hp. Type RS is available in capacities up to 50 hp.

For full details, ask your Link-Belt district sales office or authorized stock-carrying distributor for Book 2274. You'll find them in the yellow pages of your local phone directory under Power Transmission Equipment.



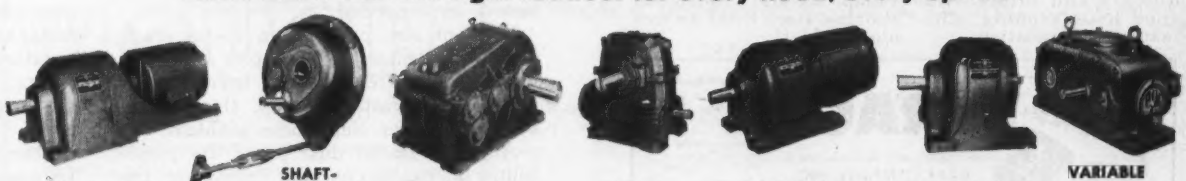
INSTANT SPEED CHANGING is achieved by simply turning handwheel to desired position on easy-to-read dial. P.I.V. drives are also available with electric, pneumatic or hydraulic controls. Here P.I.V. drive and Link-Belt roller chain accurately regulate speed of rolls in roller-hearth furnaces used to heat-treat jet engine parts.

LINK-BELT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

15,348

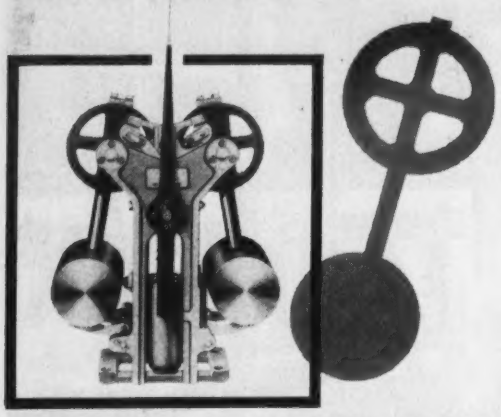
LINK-BELT has the right reducer for every need, every speed



MOTOGEARS | SHAFT-MOUNTED | PARALLEL SHAFT | WORM | GEARMOTORS | IN-LINE | VARIABLE SPEED

Check 1234 opposite last page.

HEAVYWEIGHTS!



DETECTO PENDULUMS

are the heaviest in the industry. This means longer, more accurate scale life.

Write for information on full line of industrial weighing equipment from 1/100 oz. to 100 ton:

Detecto Scales, Inc., Dept. J-5, 540 Park Ave., Brooklyn 5, N. Y.

Check 1236 opposite last page.

Mix and move fluids quickly ...pump direct from drum!

Graco Fast-Flo Pumps reduce handling costs. They transfer measured amounts of different fluids direct from original containers. Ideal for batching, applying or mixing . . . fluids are transferred quickly and safely. Aids good housekeeping; eliminates contamination.

Send for more information about this amazing *Graco* Fast-Flo that's suited both for large and small operations. It handles materials as thin as alcohol, as thick as cookie frostings! Fast-Flo Pumps are also available in stainless steel. Send for free idea booklet!

For nearest GRACO Supplier SEE the telephone directory YELLOW PAGES Look under "SPRAYING EQUIPMENT"

GRACO

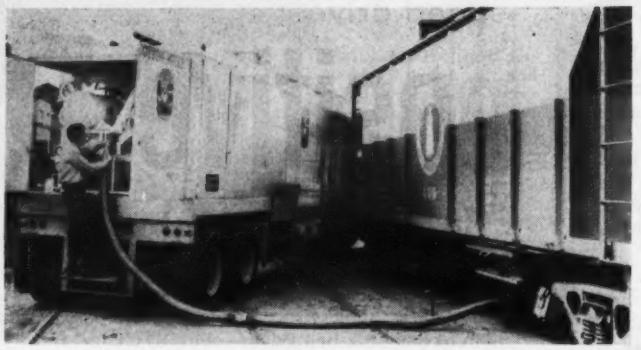
ENGINEERS AND MANUFACTURERS

GRAY COMPANY, INC.
112 Graco Square
Minneapolis 13, Minnesota

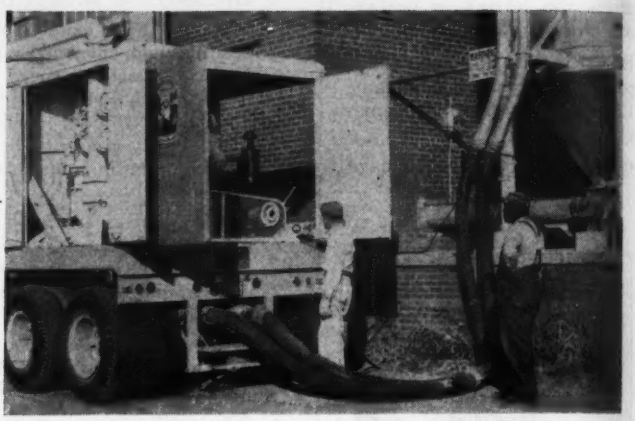
Factory Branches
New York, N. Y.
Philadelphia, Penna.
Detroit, Michigan
Atlanta, Georgia
Chicago, Illinois
Houston, Texas
San Francisco, Cal.

Sales Office
Toronto

Check 1237 opposite last page.



Bulk-handling trailer is readied for unloading of railroad car. Approximately 25,000 lb of starch, truck capacity, can be transferred in 35 to 45 minutes



Trailer's load is transferred to storage silo in about 30 minutes without dust problem. One hose handles material while second recirculates air to filter on trucks, eliminating need for dust collector at plant

Bulk shuttle service

Starch trailer supplies 7 mills, lops 22c/lb off bag price

Problem: Multiple handling, safety hazards, waste, and plant uncleanliness were among the disadvantages inherent in the handling of starch in bags at seven grey mills operated by Springs Cotton Mills near Lancaster, S.C.

Starch was received in 120-lb bags from a midwestern supplier by railroad, the bags palletized by hand, transported to warehouses by fork-lift trucks, and stored until needed.

In plant size preparation rooms, bags were then manually dumped into day bins, causing frequent bag breakage. In addition to wasting starch, this aggravated the plant cleanliness problem.

Airborne starch dust posed the possibility of explosions and impairing the health of workers as a result of inhaling dust.

Repeated handling of heavy loads increased personal hazards for employees — fatigue, strains, even injury.

Solution: Two years ago Springs Cotton Mills converted to bulk handling by purchasing a pneumatic bulk-handling trailer and 12 specially-equipped hopper cars for use on the company-owned Lancaster & Chester railroad.

The 60,000-lb capacity hopper cars are equipped with special unloading valves, designed by the truck manufacturer and installed by the railroad car manufacturers, which permit direct coupling to the trailer's pneumatic conveying system.

Starch is stored in the cars on the Lancaster, S.C., siding until it is unloaded by the trailer for transport directly to plant storage facilities. Springs'

quality-control department samples each lot while it is still in the hopper cars.

The trailer operates on a weekly schedule, shuttling between the siding and seven mills within a 30-mile radius. It can unload 25,000 lb of starch from a hopper car in 35 to 45 minutes (20 tons/hr vacuum loading and pressure unloading rate), transport the starch to one of the seven mills, and transfer the cargo into a storage bin in about 30 minutes. A driver-operator and helper constitute the total labor force required.

Unloading of hopper car is accomplished by coupling it to the trailer with a 4" flexible rubber hose. A pressure-vessel-type of conveying system or blow-tank operation is utilized to load and unload the bulk starch. This system offers the advantage of eliminating rotary air locks which have a tendency to grind granular materials and degrade particle size.

At the delivery point, bulk starch is funneled from the trailer's storage compartments into a common, underslung transport line that is connected to the plant pipeline by 5" flexible hoses.

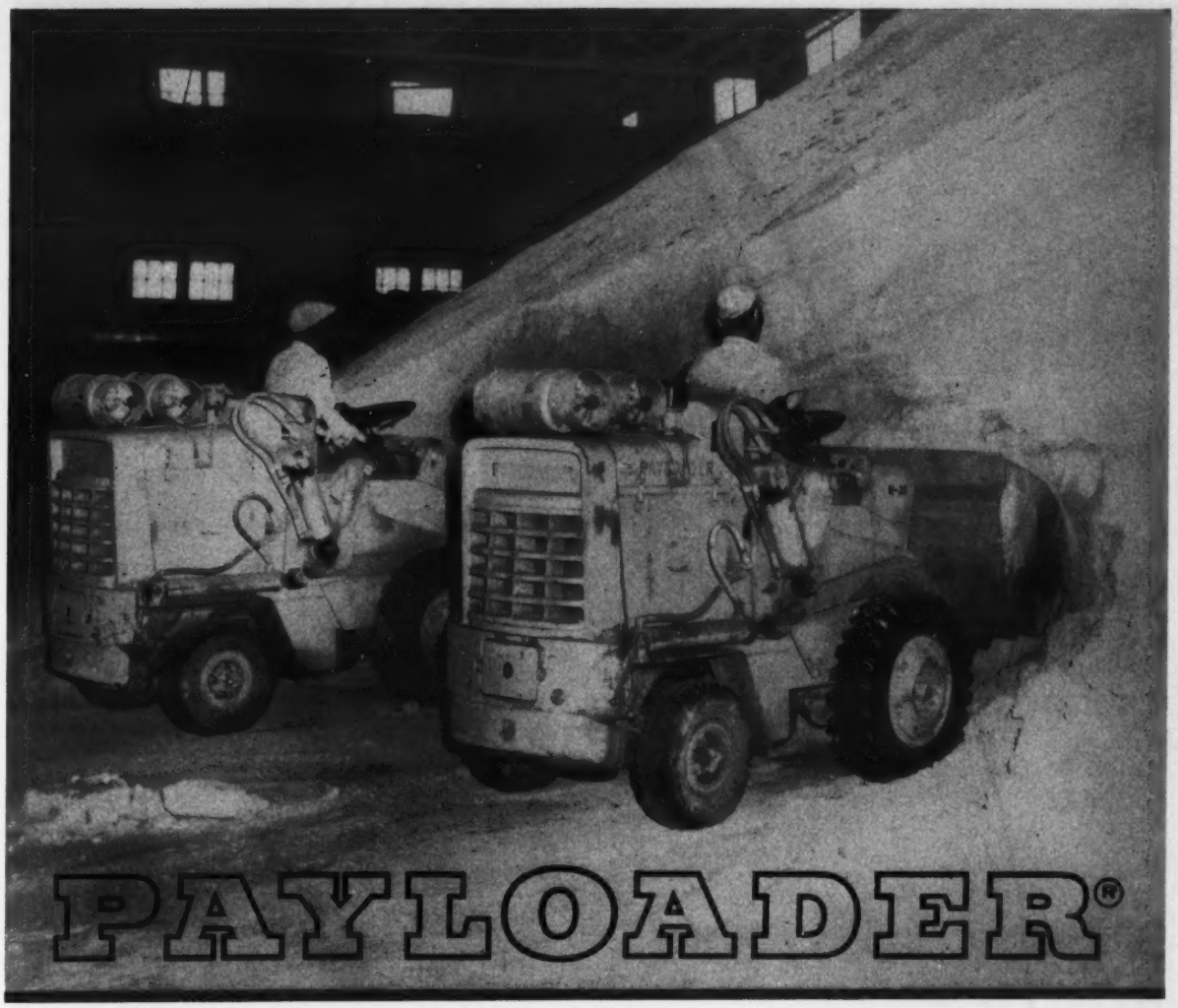
Two pipeline connections are made at the plant — one to deliver the starch and the second to recirculate dust-laden air to a bag-type filter installed on the trailer.

This eliminates the need for a dust collector at each plant and prevents accumulation of atmospheric moisture.

The workhorse of this bulk-handling system is 33' in overall length and is equipped with three high-tensile-steel storage tanks. A rear compartment houses the engine, blowers, pneumatic hose connections and controls for the built-in conveying system. Conveying hoses are stored in another compartment beneath the storage tanks.

This system is capable of delivering starch to storage areas up to 200' above the street-level unloading point.

At the mills, starch is stored in either exterior vertical silos or horizontal bins located in



"Model H-25's are real producers . . .

and have proven to be dependable on continuous operations", says C. L. Williams, Plant Supt. of Gulf Fertilizer Company, Tampa, Florida. "The maintenance on our two H-25s has been lower than on any loader previously used. We find the quick tip-back bucket action gets capacity loads without real strain on the loader, and delivery speeds are fast. We also save on tire wear with the power-shift transmission."

Owner's reports on the H-25 "PAYLOADER" usually stress both its high output, and its dependable, low-maintenance performance. Mechanical excellence plus extraordinary protection against dust and dirt damage are the two basic reasons for these dual benefits.

Mechanical Excellence includes the Hough power-shift transmission — exclusive in its class with two speeds forward *and* reverse; power-steer; power-transfer differential; 4,500 lbs. breakout force; 2,500 lbs. operating capacity; shortest turning radius of only 6 ft.

Extraordinary Protection includes triple air cleaner system; cartridge-type oil filters on all three oil systems; sealed self-adjusting hydraulic service brakes; parking brake enclosed in transmission; special grease and oil seals on all vital points.

Your Hough Distributor wants to show you how this tractor-shovel can "ease the profit squeeze" of your bulk handling. See him soon, or send for full information.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY - INTERNATIONAL HARVESTER COMPANY

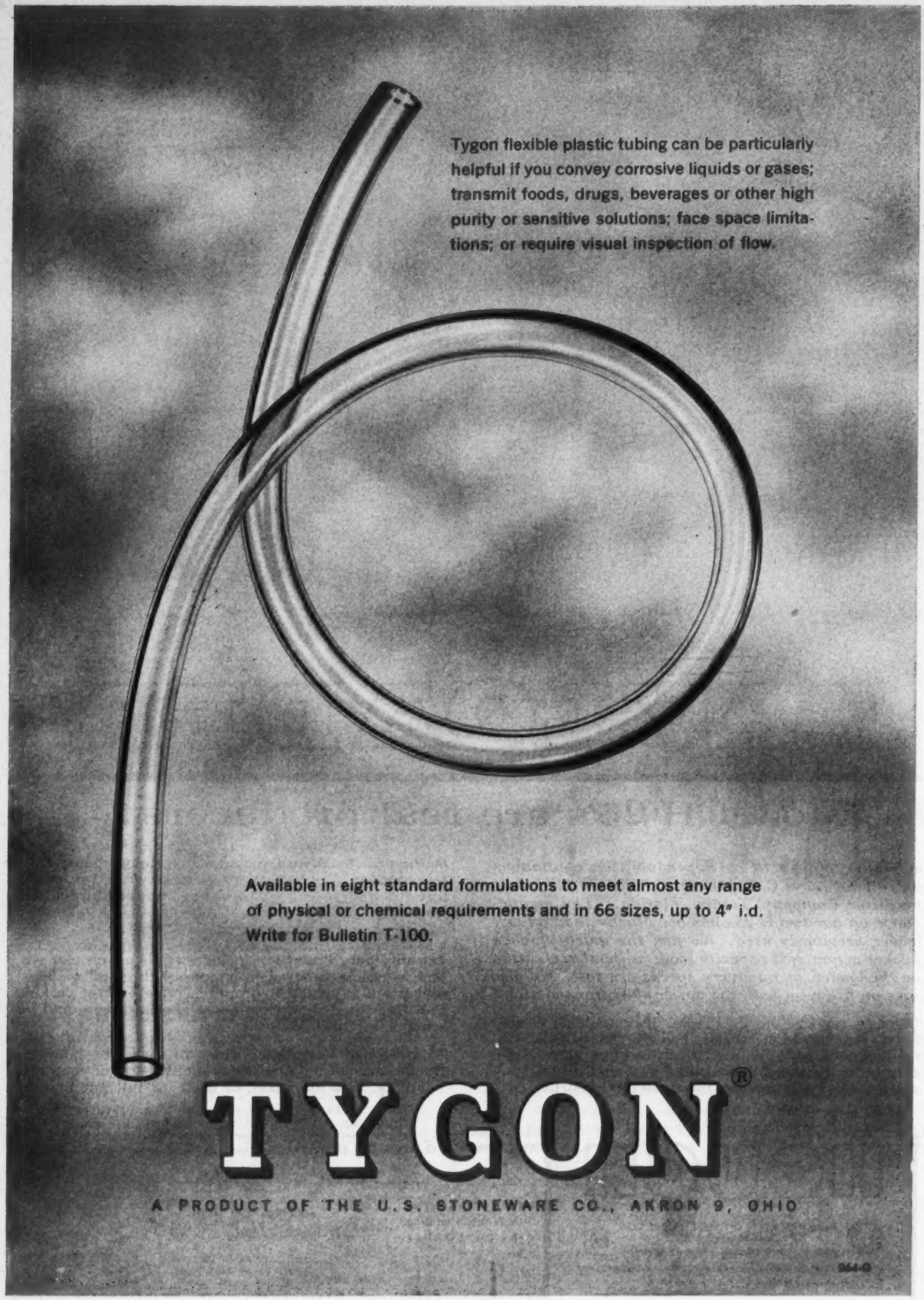
HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER, PAYLOMATIC and PAY are registered trademark names of The Frank G. Hough Co.

THE FRANK G. HOUGH CO., 744 Sunnyside Avenue, Libertyville, Ill. 11-A-1

Send "Industrial Materials Handling the PAYLOADER way."

NAME
TITLE
COMPANY
STREET
CITY STATE

Check 1238 opposite last page.


Tygon flexible plastic tubing can be particularly helpful if you convey corrosive liquids or gases; transmit foods, drugs, beverages or other high purity or sensitive solutions; face space limitations; or require visual inspection of flow.
Available in eight standard formulations to meet almost any range of physical or chemical requirements and in 66 sizes, up to 4" i.d. Write for Bulletin T-100.
TYGON®
A PRODUCT OF THE U.S. STONEWARE CO., AKRON 9, OHIO

Check 1239 opposite last page.

or near size preparation rooms. Storage capacities range from 35,000 to 100,000 pounds.

Results: Springs Cotton Mills officials are reluctant to divulge exact savings figures. However, some idea of the advantages entailed in the changeover can be gleaned from the fact that 22¢/100 lb has been trimmed from the price of the starch by buying it in bulk instead of bags.

With the trailer supplying the mills with millions of lb of starch this year, the savings ($132 per carload) assumes substantial proportions.

Multiple handling — palletizing and transporting by fork lift — has been eliminated; warehouse space conserved; and the health and accident hazards from airborne starch dust and handling of heavy objects nullified. In addition, plant housekeeping has been simplified and waste from bag breakage halted.

(Airveyor Bulk Transport is manufactured by the Fuller Company, Catasauqua, Pennsylvania.)

Check 1240 opposite last page.

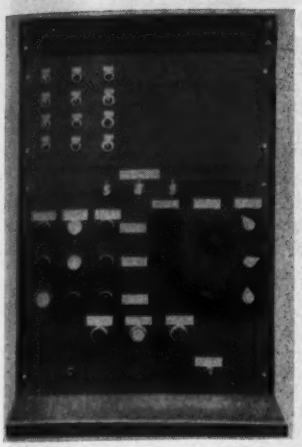
Binary techniques used by weighing system for automatic batching

Uses: Controls weighing efficiency and reliability in applications involving formulation of materials by automatic batching.

Features: Direct digital system is completely compatible with modern control equipment, including computers, punch card programmers and data logging to tape or printers. Unit achieves accuracy of 0.02%.

Description: Latest techniques in binary decimal language are utilized to provide flexibility and simplicity in weight setting.

Flexure pivots in three-point, non-redundant suspensions are used to prevent introduction of unknown and unpredictable forces. A parallelogram linkage with flexure pivots is used between weigh beam and the weight receiver



Control panel for system utilizing binary decimal language

platform. Exact positioning of the weights is not critical. Accuracy is determined primarily by individual weights which can be calibrated to any degree of precision.

Over-and-under dial indicator provides high resolution of reading accuracy. One pound in 10,000 can readily be set.

Other characteristics include repeatability, 0.010%; Linearity, 0.01%; and Sensitivity, 0.008%.

(Dynabatch control system is described in Automatic Weighing Cat 200 available from Dynametrics Corporation, Northwest Industrial Park, Burlington, Mass.)

Check 1241 opposite last page.

Bulk-handling bins now available in magnesium

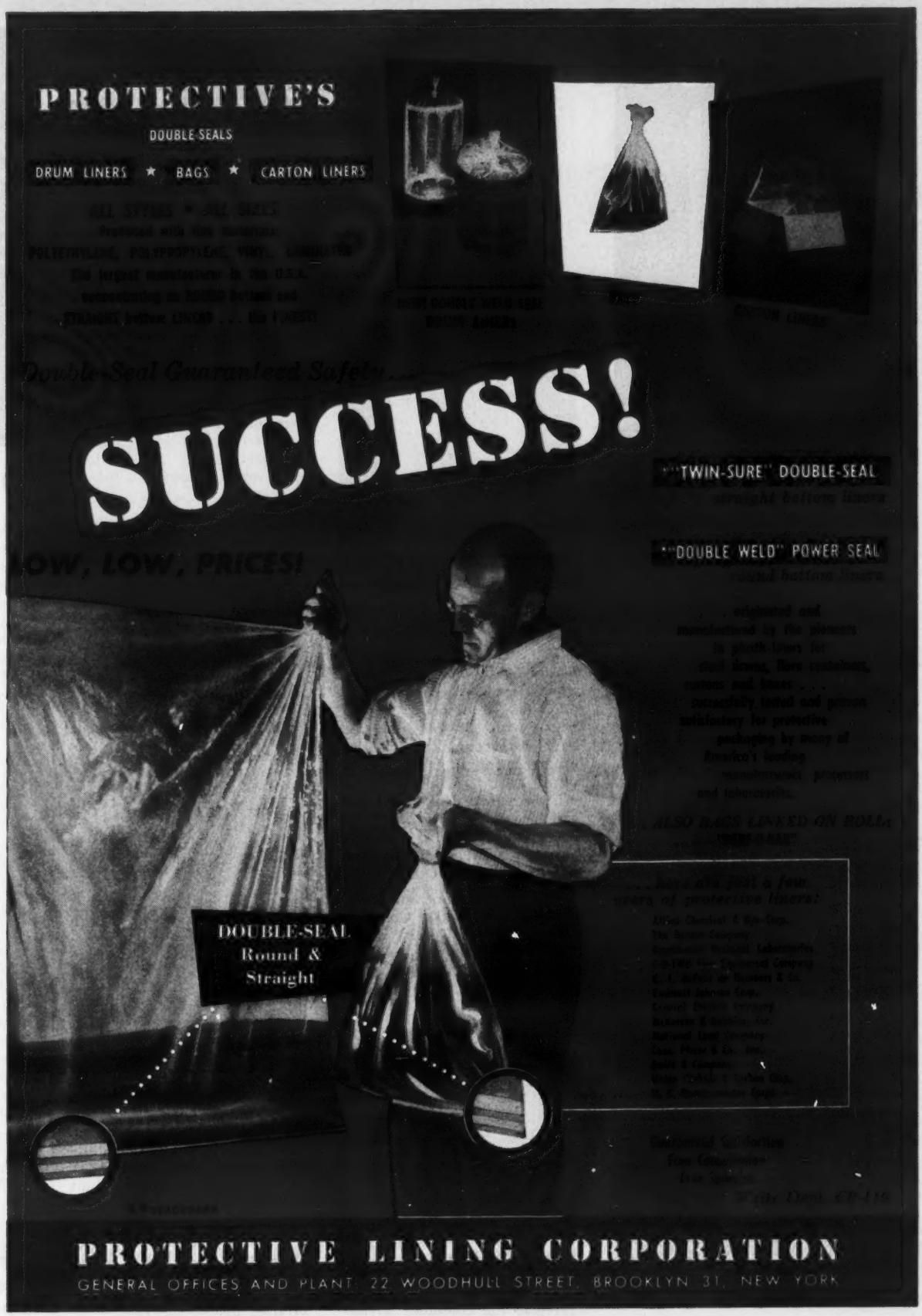
Magnesium bulk-handling bins about 40% lighter than standard aluminum containers, now are available at same price as aluminum containers.

Price equalization policy applies to all sizes from 42- to 110-cu-ft capacity containers for dry product handling, and 300 and 400 gal capacity tanks for liquid handling.

Bins serve as shipping containers, storage units and discharge hopper.

(Magnesium Tote Bins are available from Tote System, Inc., Beatrice, Nebraska.)

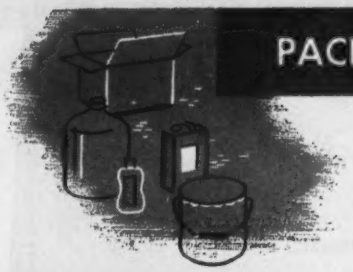
Check 1242 opposite last page.



Check 1243 opposite last page.

New...

ALLIS-CHALMERS
...power for a growing world



PACKAGE IDEAS

Latest developments in packages and their design

Carrying handle . . .

. . . instead of finger ring is feature of gallon jug fabricated from conventional polyethylene. Pourspout, having neck with 38-430 modified semi-buttress threads for greater strength is positioned offset.

Closures are leak-proof and skip-proof. Jug will resist acids, strong alkalis, corrosive aqueous solutions of salts and most organic solvents.

(Nalgene jugs are manufactured by The Nalge Co., Inc., 75 Panorama Creek Drive, Rochester 2, N. Y.)

Check 1244 opposite last page.

Square but hep . . .

. . . non-breakable plastic finger-grip jug combines advantages of square shape, double handles, while offering weight savings of more than 90% over conventional containers.

Packed in re-usable shipping container, jug withstands corrosive action of acids and alkalis, and is unaffected by extremes of heat and cold.

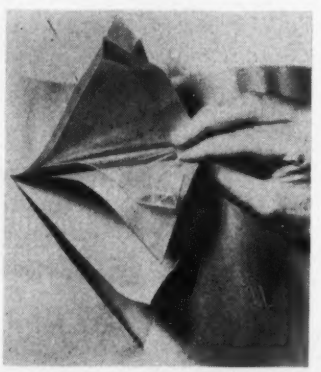
Containers are blow-molded of high density polyethylene and can be easily labeled or silk screen decorated.

(Finger-grip jugs are produced by Plastics Division, Hydrocarbon Chemicals, Inc., Locust Street, Keyport, N. J.)

Check 1245 opposite last page.

(Grex high density polyethylene is a product of Polymer Chemicals Division, W. R. Grace & Co., 225 Allwood Road, Clifton, N. J.)

Check 1246 opposite last page.



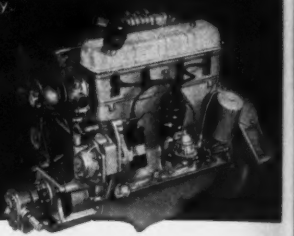
Unique construction

. . . is feature of line of moisture resistant multiwall shipping sacks. Bags consist of separate, intermediate ply (not a liner) of lightweight polyethylene spot-pasted at top and bottom to adjacent layers of heavy-duty kraft. Polyethylene film, thus, is protected from abrasion and mechanical injuries inside and out.

Standard sizes are 25, 50 and

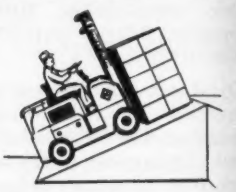
..power

The three new Allis-Chalmers F series lift trucks shown at the left are driven by a new POWER-CRATER engine built by Allis-Chalmers. The unique crater-shaped piston head sets up violent swirling turbulence, thoroughly mixing fuel and air. Because of this proper mixing, a higher percentage of fuel is transformed into useful energy.



performance

Power, balance and weight distribution to climb steep grades • Roller channel steel masts for smooth, fast lifting • Simple, "easy-to-turn" steering, one-lever gear shift • Pivoted steer axle for smoother riding, positive traction • Comfortably wide, adjustable, ventilated-cushion seat • Positive, safe braking — two systems.



..economy

Substantial fuel savings with new POWER-CRATER engine • Replaceable wet cylinder liners in engine save time and money • Easy serviceability — clutch change in only 30 minutes, counterweight quickly removed • Solid 2" x 5" bar-steel, heavy-duty frame • Optional transmissions — standard or POWER-SHIFT drive.

Let your dealer show you how new F series trucks *do more, save more.* Send for new bulletin BU-640. Allis-Chalmers, Milwaukee 1, Wisconsin.

POWER-CRATER and POWER-SHIFT are Allis-Chalmers trademarks

BM-1438

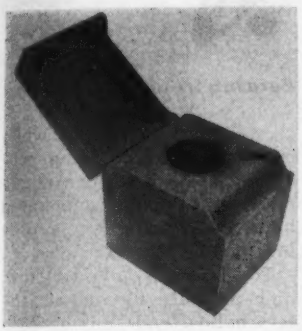
ALLIS-CHALMERS
...power for a growing world

Check 1247 opposite last page.

100 lb with either sewn-open-mouth or sewn-valve closures.

(Poly-ply multiwall bags are manufactured by Chase Bag Company, 153-157 East 44th Street, New York 17, N.Y.)

Check 1248 opposite last page.



Self-hinge package . . .

. . . of polyurethane foam based on diisocyanates includes a cored bottom and fitted, hinged top, cut from single cube of black polyurethane foam. The hinged top is formed by slicing through block of foam to within ½" of end. Bottom of container is then cored to accommodate object. Container measures 10 x 8 x 12" and weighs ¾ lb. Seven colors of foam available.

(Polyurethane foam containers are produced by Paramount Foam Industries, Ridgefield, N. J.)

Check 1249 opposite last page.

(Nacconate polyurethane foam is a product of National Aniline Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.)

Check 1250 opposite last page.

NEXT MONTH

Quality was improved, production efficiency increased and costs reduced when National Electric Division, H. K. Porter, converted to continuous precision metering of PVC color chips at its Ambridge, Pa., insulation fabrication plant. The story of how this was accomplished will be told in this section next month.

FULLER PNEUMATIC CONVEYING SYSTEMS INCREASE PRODUCTION, CUT CONTAMINATION FOR GOODYEAR

Recent installation of specially engineered Fuller Airveyor® pneumatic conveying systems to handle pelletized rubber has helped Goodyear Tire and Rubber Company increase production. These systems are the latest Fuller design resulting from over 15 years experience in pneumatic conveying of rubber pellets. These completely enclosed automatic systems virtually eliminate contamination problems and greatly reduce the chance of loss due to spoilage.

Automated handling of crude rubber with Fuller Pneumatic Conveying Systems, in place of conventional rubber slab sheeting on a mill, is the key. One Airveyor system conveys the pelletized rubber from the pelletizer to a weigh station, a distance of 500 feet. Four more systems operate from the sink dump scales to inlet spouts of the finish-run Banburys.

All of these Airveyor pneumatic conveyors are of the vacuum type, employing positive pressure exhausters for air supply. Each conveying system is equipped with its own individual bag-type filter, automatic in operation, which provides for 100% visible dust retention. Exhausters and filters are located on the roof. A control panel permits manual or automatic operation of the entire handling system.

If you are handling dry, bulk, granular materials, a Fuller Conveying System application-engineered to your process can be equally advantageous. Look to Fuller, whose range of products coupled with experienced know-how offers you the best *single source* for solving pneumatic materials handling problems. Just call or write Fuller today outlining your problem—no obligation, of course. A-288 1934

For details on Fuller Production Line, see Chemical Engineering Catalog.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
136 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
. . . pioneers in harnessing AIR

Check 1251 opposite last page.

Raymond BAG CORPORATION
A Division of Albemarle Paper Mfg. Co.
MIDDLETOWN, OHIO

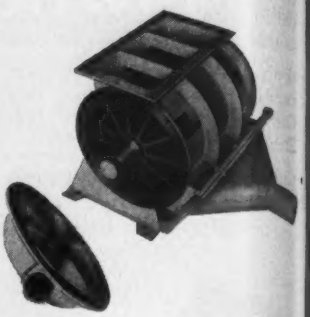
*MPS gives protection and strength resulting from combining the features of an independent polyethylene tube and a multiwall paper shipping sack to make a flexible package for the most critical requirements of storing and shipping.

*MPS is a production line package that can be filled on regular packing equipment —a package that eliminates troublesome seams and avoids liner slip and pull-out.

*MPS offers the exciting new possibilities for packaging Chemicals and other difficult-to-pack-and-ship products. Get the facts—contact us direct—or ask your Raymond Multiwall man.

Maker of RUGGED Multiwall Packaging for Industry • Atlanta • Baltimore • Chicago • Kansas City • Louisville • New York

Check 1252 opposite last page.



Bearing trouble . . .

. . . often a problem when pneumatically conveying certain types of products is eliminated with recently announced high-pressure feeder, according to manufacturer.

To maintain product flow, high-pressure filtered air enters hollow end bells on each end of feeder and feeder pockets near product discharge point. This double inlet action thoroughly mixes the air with product being conveyed, sweeping pockets clean and increasing volumetric efficiency of the unit.

Air chambers keep a blanket of air between product and bearings, preventing contact that might gum up bearing and rotor shafts.

(Air Swept feeder is being introduced by The Day Company, 810 Third Avenue N. E., Minneapolis 13, Minnesota.)

Check 1253 opposite last page.

Collapsible containers with disposable liners do multiple service

Can carry solids one way; chemical liquids on return

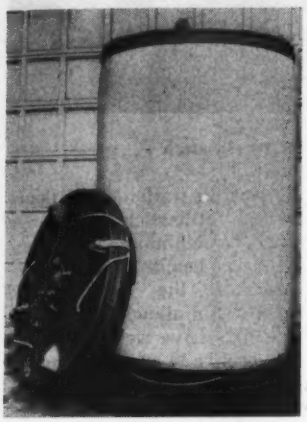
Collapsible plastic containers, currently being introduced in this country, can be used to carry grains, for example, one way and liquid chemicals on the return trip.

Developed in Germany, versatility of containers is derived from use of thin disposable plastic liners inside a heavy-duty plastic body which can be handled by conventional fork truck, hoist or crane equipment.

Containers can be used in-

terchangeably for such diverse commodities as oils, chemicals, greases, dairy products, cement, plaster and fertilizers without extensive cleaning or danger of contamination.

Cylindrical body of containers consists of molded, fiber glass-reinforced plastic top and bottom shells and flexible plastic-coated fabric sidewalls



Container (right) ready for use and (left) collapsed

which collapse, accordionlike, into the top and bottom. Sidewall material is of special composition.

Cost of disposable liners is less than for cleaning steel drums or replacing one-way paperboard containers.

Filled through quick-opening orifices in top and bottom, complete ejection of fluent solids is assured by funneling action of the liner.

All containers are 47″ in diam and collapse to 12″ high. Three sizes will be offered: 1) 40″ high, 35 cu ft (250 gal) capacity, tare weight of 106 lb; 2) 69″ high, 70 cu ft (500 gal) capacity, tare weight of 113 lb; and 3) 98″ high, 105 cu ft (800 gal) capacity, tare weight of 120 lb.

(Flexi-Drum containers are being introduced by Highway Trailer Industries, Inc., New York City.)

Check 1254 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

PNEUMATIC MATERIALS CONVEYING BY ALLEN-SHERMAN-HOFF

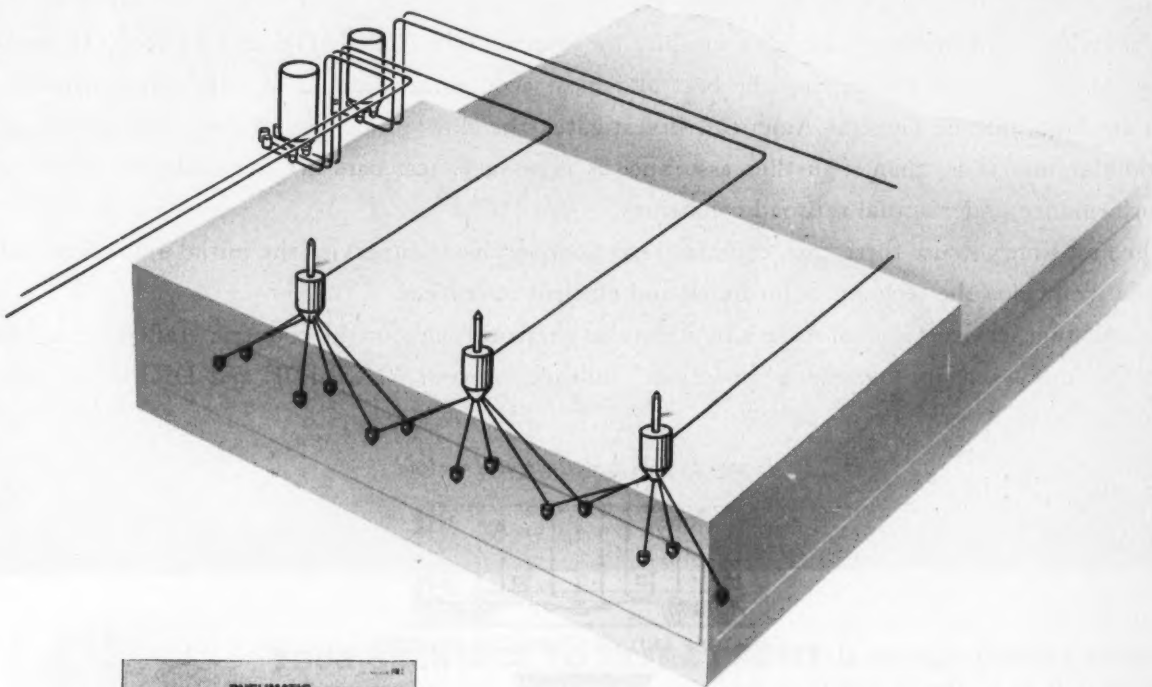
The positive pressure conveying system illustrated below is a page from our *new* Pneumatic Materials Handling Bulletin, PM-1. This is a system we engineered to deliver pellets from storage to a multitude of individual machine hoppers for continuous feeding into process.

If you are interested in investigating the advantages of conveying materials by air, we would like to send you a copy of this *new* bulletin. It pictures systems we've engineered and points the way to help in solving many of the materials handling problems of your plant and your materials.

THE ALLEN-SHERMAN-HOFF COMPANY pioneered in the field of materials handling systems—both pneumatic and hydraulic. Today we have systems in operation throughout the world, primarily in plants *where reliability of performance is of paramount importance.*

Discuss your materials handling problems with an A-S-H Representative—he's a pneumatic conveying expert. If there is any question about conveying your material, he'll arrange to have evaluation tests conducted by our Research Group. For his name and your copy of Bulletin PM-1, write, wire or phone . . .

THE ALLEN-SHERMAN-HOFF COMPANY, 257 East Lancaster Avenue, Wynnewood, Pa.



Our new Bulletin PM-1 points the way to Pneumatic Materials Handling for your plant and your materials. It's free for the asking.

Check 1255 opposite last page.

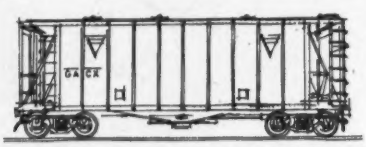
Let Our Tests Prove That Bulk Shipping Via AIRSLIDE® and DRY-FLO® Cars is Right For Your Product

When General American "okays" a product for shipment in AIRSLIDE and DRY-FLO cars, you know that you are getting the best and most economical method of bulk transportation. In its laboratories, General American investigates the flow properties of dry, powdered and granular materials, then if further assurance is necessary, test cars are available for checking performance under actual railroad conditions.

The first time you use these cars, experts are at your service to supervise the initial unloading and show your men the techniques for quick and efficient operation.

As a further service, General American maintains shops throughout the country, staffed by skilled technicians to ensure maximum "in-service" mileage for your AIRSLIDE and DRY-FLO cars.

It pays to plan with General American.



AIRSLIDE® AND DRY-FLO® CAR DIVISION

AIRSLIDE GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street • Chicago 3, Illinois
Offices in principal cities
In Canada: Canadian General Transit Co., Ltd., Montreal

Check 1256 opposite last page.

Drive-in rack . . .

. . . permits wall-to-wall, floor-to-roof utilization of storage space by eliminating horizontal cross beams in the structure of the prefabricated racks. This allows loaded fork truck to drive right into storage rack and pick up or unload wherever desired. As inventory requirements change, the racks may be taken down and reassembled elsewhere.

(Drive-In speedrack is development of Storage Products Corporation, 4418 Oakton St., Skokie, Ill.)

Check 1257 opposite last page.

Up to 800 qt/min filled by 36-station unit

Uses: Filling containers with lubricating oil, lubricants, brake fluids, antifreezes, solvents, sprays, deodorizers, waxes, cleaners and related products.

Features: Fills up to 800 quart containers per minute.

Description: Rotary piston filler is equipped with 36-stations and is engineered for proper synchronization with associated equipment in continuous, automatic packaging lines.

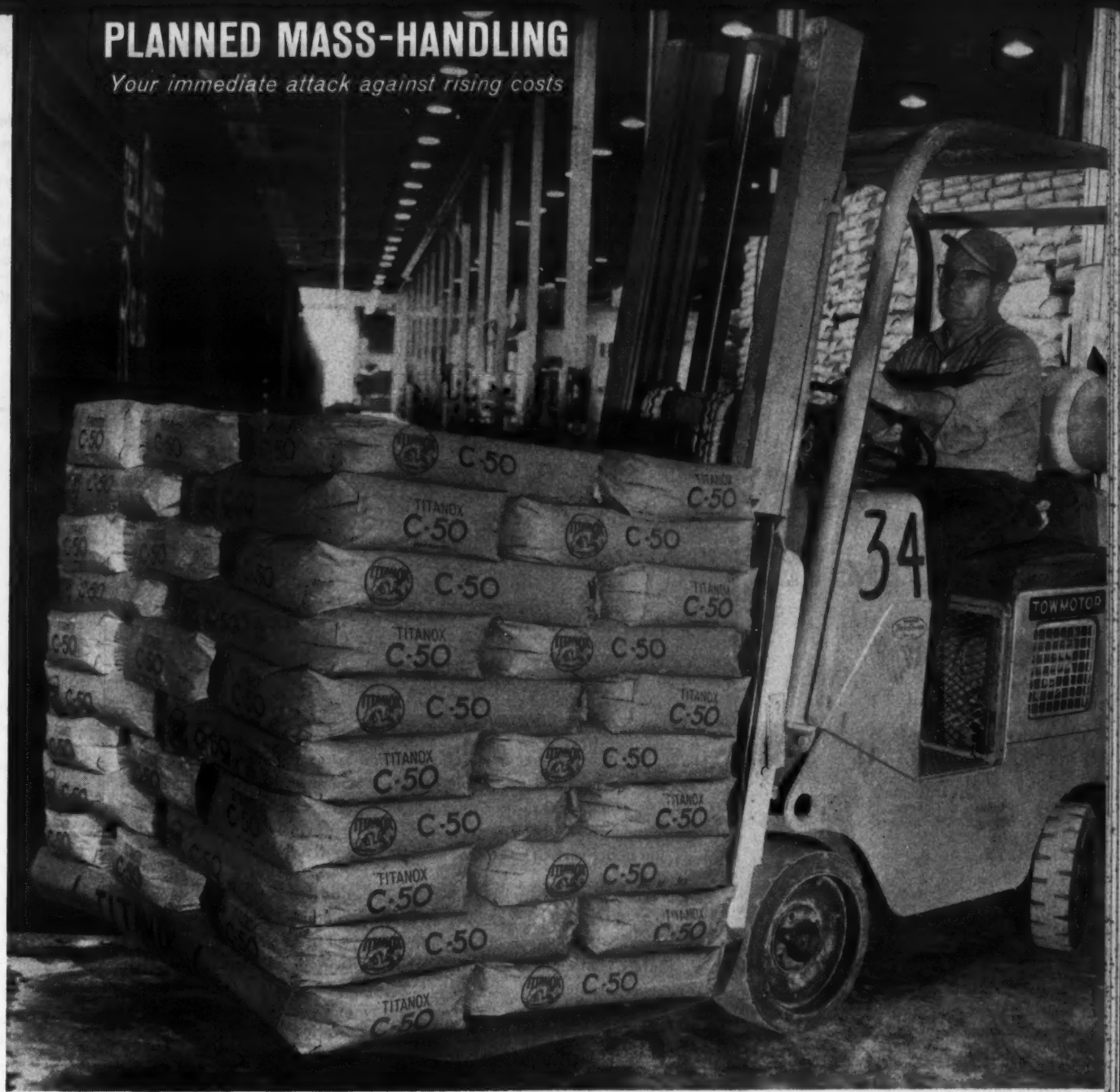
"Magnetic monitor" device provides positive control to prevent jammed valves and eliminate resultant downtime, repair costs and part replacement.

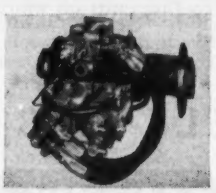
(36-station Votator filler is product of Girdler Process Equipment Division, Chemetron Corp., Louisville, Ky.)

Check 1258 opposite last page.

PLANNED MASS-HANDLING

Your immediate attack against rising costs





IT'S A FACT: The unique Towmotor Towmostatic Drive guarantees handling flexibility, smooth operation and maintenance benefits far greater than any other fork truck drive.

YOUR SHORTCUT TO EXTRA PROFIT is through planned mass-handling that puts the right equipment in the right place at the right time. Integrating TOWMOTOR fork lift trucks into your production operation is the fastest way to lower costs and increase your profits. Write for case studies that show you how companies similar to yours are reducing costs through more effective handling operations. TOWMOTOR CORPORATION, CLEVELAND 10, OHIO.

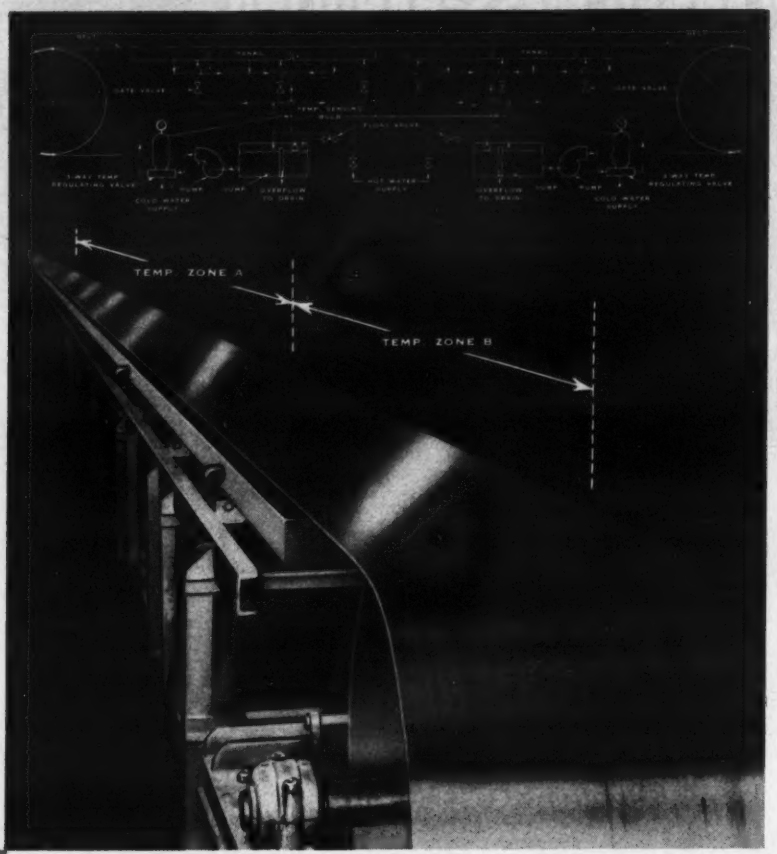
FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

TOWMOTOR® THE ONE-MAN-GANG — GERLINGER

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

For more information on product at right, specify 1259 see information request blank opposite last page.

Controlled Zone Cooling by SANDVIK *Water-Bed** Steel Belt Cooler



Schematic view shows how Sandvik Steel Belt Water Bed Cooler operates. Solid steel band "floats" on water-bed tank of circulating water or other coolant. Coolant pressure assures 100% contact with bottom of belt.

*Trademark

SOME TYPICAL MATERIALS BEING COOLED ON SANDVIK WATER-BED COOLERS

Aluminum Sulphate • Ammonium Nitrate Asphalt • Coal Tar Pitch • Chlorinated Wax DDT • Gelatine • Maleic Anhydride • Phosphate Glass • Phthalic Anhydride • Polyethylene Wax Resins: (Hydro Carbon, Epoxy, Vinyl, Synthetic, Wood Rosins) • Sodium Metasilicate • Sulphur TNT • Triphenol Phosphate • Zinc Nitrate • And Other Materials

With a Sandvik steel-belt cooler you can regulate cooling rate to suit the requirements of your process. This important Sandvik feature is being used today in the continuous solidification and flaking of aluminum sulphate and other materials. By controlling the temperature of the coolant under various sections of the belt, the desired cooling rate is achieved.

This is another aspect of the versatility of Sandvik units in chemical processing. They are used to cool and solidify liquids, regulate thickness while cooling, cool loose and pulverized materials, cool materials in layers, cool solids in sheet form, cool and strip off gelatinous materials in sheet form etc.

Sandvik belt coolers handle a wide variety of materials with feed temperatures up to 1900°F and capacities as high as 25 tons per hour. Ask for Sandvik's cooling data on the material you are processing.

Sandvik also has portable, experimental cooling units on which you can make small scale trials in your own plant.

SANDVIK STEEL, INC.

STEEL BELT CONVEYOR DEPARTMENT

1702 Nevins Road, Fair Lawn, N. J. • SW 7-6200
Cleveland • Detroit • Chicago • Los Angeles
IN CANADA:
Sandvik Canadian Ltd., P. O. Dr. 1335, Sta. O., Montreal 9, P. Q.

SANDVIK STEEL BELT CONVEYORS

MANUFACTURERS OF STEEL BELT CONVEYORS FOR OVER 40 YEARS

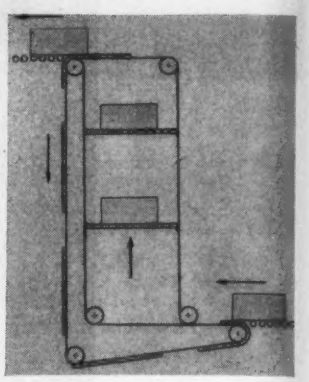
SS-219

Check 1260 opposite last page.

Vertical conveyor loads and unloads self

Utilizing revolutionary principle in vertical movement of packaged or unit commodities is vertical conveyor which has continuity of belt conveyor and loads and unloads itself automatically.

Machine is equipped with horizontal flights for carrying



which fold automatically to assume a space-saving vertical position for return trip. Compactly designed, it requires less floor space than monostrand or straight lift conveyor.

(Escaveyor is described in Bul 125 available from Standard Conveyor Company, North St. Paul 9, Minnesota.)

Check 1261 opposite last page.

NEW LITERATURE
Material Handling and Packaging

Idlers for deep-trough belt conveyors are discussed in 8-page bulletin which contains selection data on 60 new 35° deep-trough idlers and 24 additions to line of 45° idlers. Capacity ratings and design information are also included in Bul 2716A—Link-Belt Company.

Check 1262 opposite last page.

Bag dumpers which can handle variety of bags including burlap, multiwall, open-mesh, cotton, polyethylene, other textiles and plastics, are detailed in Bul 100—Conveyors and Dumpers, Inc., Division of Mercury Industries.

Check 1263 opposite last page.

Advantages of renting materials handling equipment, equipment available, and services available are cited in 16-page Rental System Bul—Clark Rental Corp.

Check 1264 opposite last page.

Scraper-bucket machines for storage and reclamation of bulk materials are described in Drag-Scraper Cat—Sauerman Bros., Inc.

Check 1265 opposite last page.

Inspection procedure for wooden pallets is covered comprehensively in Inspection Procedure Bul—the National Wooden Pallet Manufacturers Association.

Check 1266 opposite last page.

Feeders and rotary valves designed to handle variety of dry pulverized and granular materials are described in Bul F-5A—Fuller Co.

Check 1267 opposite last page.

Walking beam conveyor, consisting of series of reciprocating bars designed to pick up parts, boxes, crates or pallets and transport them, is subject of Power-Bar Cat—Conveyor Corporation.

Check 1268 opposite last page.

Hoists, winches, drives, hooks and accessories, including remote release cargo hook, are presented in Winches and Hoists Cat—Breeze Corporations, Inc.

Check 1269 opposite last page.

Flat-top steel belt conveyor, offering flexibility of rubber belt with positive drive and wheel-track construction, is described in Multi-Flex Bul — Prab Conveyors, Inc.

Check 1270 opposite last page.

Efficiency gains possible with low-density or high-density conveying systems and typical arrangements are discussed and illustrated in 16-page Conveying Systems Bul—The Day Company.

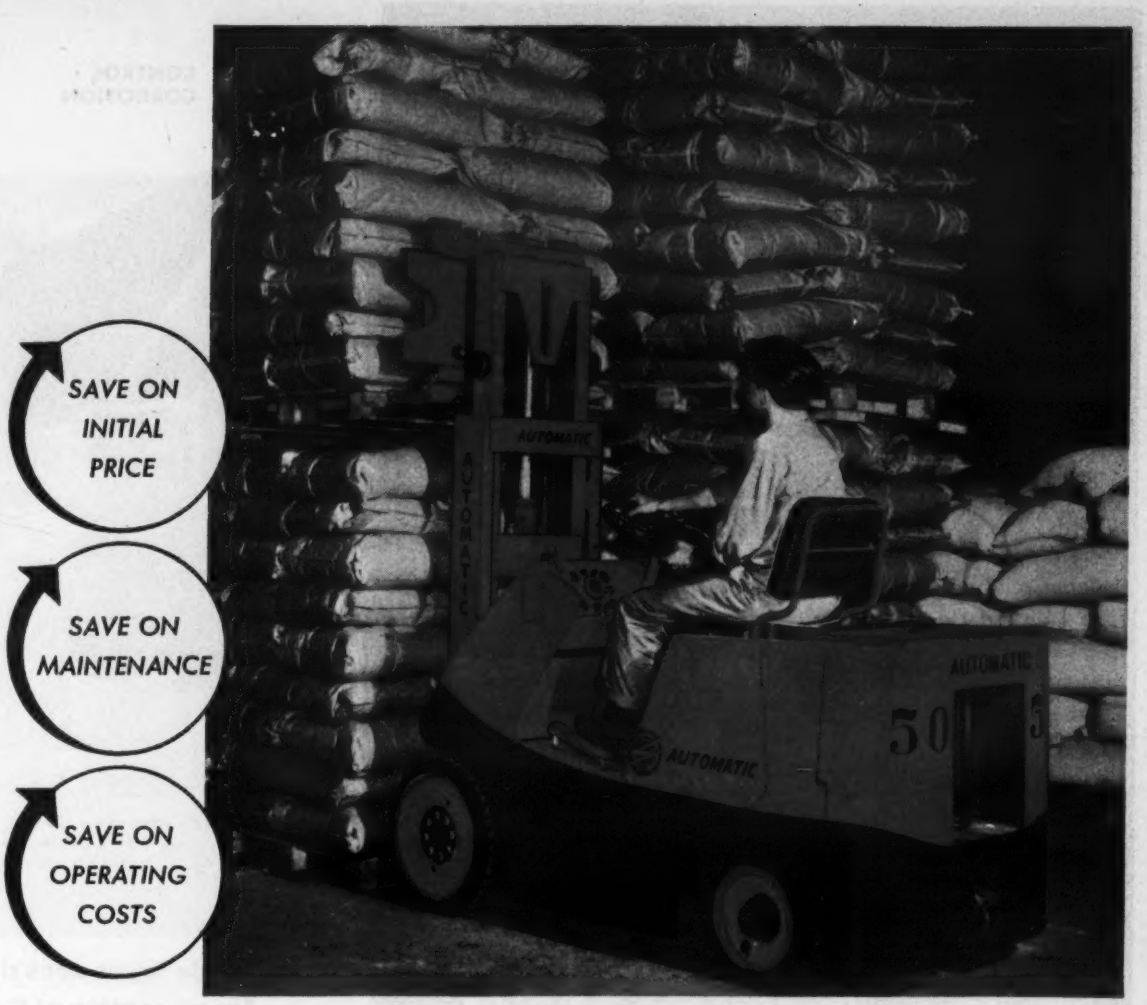
Check 1271 opposite last page.

Materials handling system, gravity conveyors, powered conveyors, framing material and live storage racks are among the subjects covered in 44-page Rapistan Cat—The Rapids-Standard Co., Inc.

Check 1272 opposite last page.

Stretcher-sealers which combine all strapping operations—tensioning, automatic placement of seal, sealing and cutting of strap—in one operation, are explained in Stretcher-Sealers Bul—A. J. Gerrard & Company.

Check 1273 opposite last page.



EASE THE PROFIT SQUEEZE WITH AN AUTOMATIC® GAS LIFT TRUCK

A truck that's down for repairs costs plenty. So does one that gulps fuel. AUTOMATIC's answer: a truck with no clutch to shift or wear out, no complicated torque converter to breakdown . . . a truck that saves you up to 30% on fuel . . . and yet costs no more to buy.

With as many as 200 fewer wearing parts compared to conventional power shift units, the danger of unexpected downtime is practically eliminated. So is the cost of complex and frequent repairs. An AUTOMATIC *gas* truck means less maintenance . . . easier maintenance.

Cutting fuel bills, while at the same time increasing output, is another profit-saver. AUTOMATIC's high efficiency transmission gives higher torque while moving more tonnage per hour with less fuel.

Check initial cost. AUTOMATIC's gas lift truck is priced competitively to all other trucks of the same capacity equipped with automatic transmission.

It's a sound formula to combat the profit squeeze: save on initial cost, save on maintenance, save on operating costs.

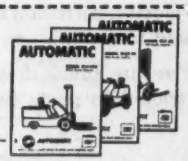
Capacity with cushion rubber tires, 3000 to 10,000 lbs., pneumatic tires, 3000 through 8000 lbs.

AUTOMATIC

AUTOMATIC TRANSPORTATION COMPANY
Division of The Yale & Towne Manufacturing Company
41 West 87th Street, Dept. WO, Chicago 20, Ill.

FIRST IN IMAGINATION
FIRST WITH REALITY

WRITE FOR DESCRIPTIVE LITERATURE
Please send full details on Automatic Gas-Operated Lift Trucks:



Name_____
Firm_____
Address_____
City_____ Zone_____ State_____

Check 1274 opposite last page.

high
high
high-
efficiency
pump
design
reduces
destructive
velocities

...saves you money
on maintenance

Capacities to 600 gpm., heads to 180 feet. Pedestal assemblies available for base-mounted coupling connections. Close-coupled connections fit NEMA standard pump motors.

Ampco Centrifugal Pump in 316 Stainless

Ampco's modern design lengthens pump-life and steps up efficiency several ways:

Interface velocity is reduced — losses by hydraulic friction, shock, and turbulence are practically nil. Velocity, corrosion and abrasion are held to a minimum.

Pressure break-down areas are restricted to parts that are inexpensive and convenient to replace. Casing and shaft are protected — new-pump characteristics are maintained longer.

In addition to stainless steel, Ampco Centrifugal Pumps are available in Ampco aluminum bronze and Illium "G." Elastomer-lined pumps are also available. Representatives in principal industrial areas.

Write for Bulletin P-3c. Do it today.

P-48

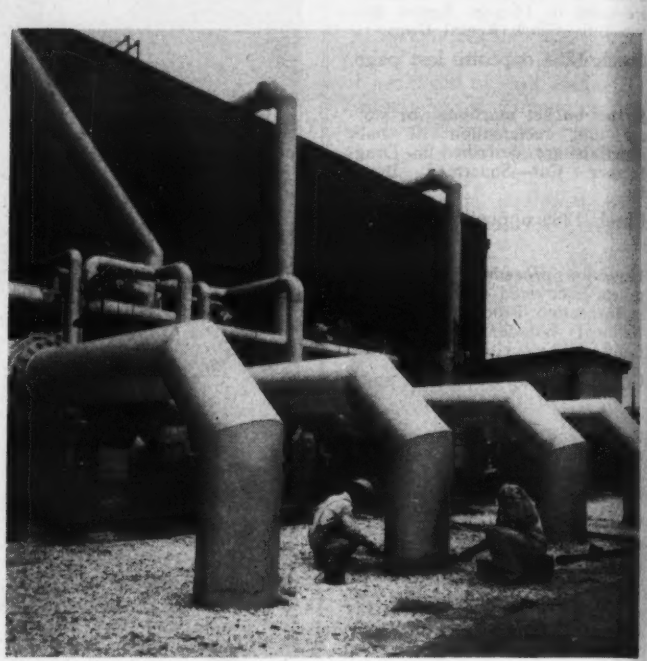
Don't overlook EFFICIENCY ... it's a yardstick of performance!

AMPCO METAL, INC.
Dept. 139K, Milwaukee 1, Wis.

West Coast Division: Huntington Park, Calif. • Southwest Division: Garland (Dallas County), Texas

Check 1275 opposite last page.

CP CONTROL CORROSION



Catalyzed epoxy coating being applied to giant water headers serving plant's cooling tower. Product forms dry film up to 20 mils thick in just one application

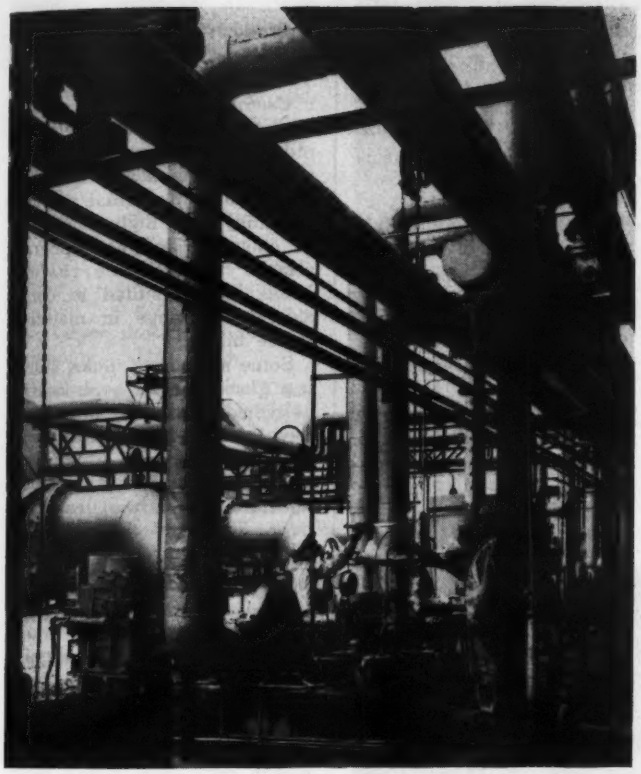
Single layer does the trick — Epoxy coating at Gulf Coast petrochemical plant . . .

Defeats acid fumes, salt air and humidity

Problem: Corrosive fumes, chemical dust and salt-water atmosphere were playing havoc with equipment and maintenance costs in a large petrochemical plant located on the Gulf Coast. The situation was aggravated even more by the high humidity prevalent in the area.

Majority of the trouble was caused by H_2S, SO_2 and SO_3 fumes. When dissolved in condensation present most part of the day on undersides of steel structures, they would cause serious damage. Equipment in areas around plant's giant cooling tower was especially hard hit.

Numerous paints and coatings were tried, but none performed satisfactorily. Multicoat systems were also investigated. These were found to fail because of a de-lamination problem. Sediment deposited on surfaces between coats caused intercoat de-lamination and subsequent formation of voids in the film. Washing surfaces before recoating did not clean them thoroughly enough to eliminate the prob-



Coating has eye-appeal as well as being functional. Available in wide range of colors, it is ideal for use in plant beautification programs

lem. Labor costs were high.

Solution: As part of the seemingly endless program of tests, a catalyzed epoxy material known as Koropon Polymil was tried on some of the equipment. Coating is specially compounded with proprietary catalytic agents to give it exceptional corrosion-resistance properties.

Product forms a dry film up to 20 mils thick with just one layer. Application time is held to a minimum. The coating is available in wide range of colors — lending itself nicely to plant beautification projects.

Results: After passing initial tests with flying colors, full-scale use of coating was immediately ordered. Large and small surfaces in all plant areas were painted with it and have stood up well.

Considerable savings in material and labor were realized through use of the coating. These were due to the material's longer service life and because the desired film thickness was attained in one rather than two or more applications.

The coating also solved a previously troublesome localized corrosion problem on hot pipe and heat exchangers. Ammonia fumes and sodium hydroxide spillage which formerly attacked the equipment have been successfully held at bay by the product. Surface temperatures on the units range from 200-250°F.

(Further information about Koropon Polymil coatings may be obtained from DeSoto Chemical Coatings, Inc., 1350 South Kostner Avenue, Chicago 23, Illinois.)

Check 1276 opposite last page.

HOW MANY OF THESE Lapp "SPECIAL SHAPE" PORCELAINS CAN YOU IDENTIFY?

Probably not too many. That's because these are all custom-made porcelains, produced for specialized needs.

Lapp Chemical Porcelain in customized shapes has solved thousands of problems where acid and/or abrasion-resistant surfaces are required.

Other important considerations are the low cost of raw materials (especially when compared with high alloys), the advantageous physical properties of Lapp porcelain (hardness, density, zero absorption, uniformity).

Custom-made porcelain can solve your problem and save you money. Ask us. Special shapes get special attention here at Lapp.

WRITE *for description and specifications of Lapp Chemical Porcelain. Lapp Insulator Co. Inc., Process Equipment Division, 2111 Poplar Street, LeRoy, New York.*

Lapp

ANSWERS: 1. Steam ejector entraining chamber; 2. Paper maker's felt conditioner plate; 3. Cyclone Classifier; 4. Godet wheel for rayon filaments; 5. Funnel cock for etching machine; 6. Roll for rayon processing; 7. Condenser chamber; 8. Outlet liner for brick line tower.

Check 1277 opposite last page.

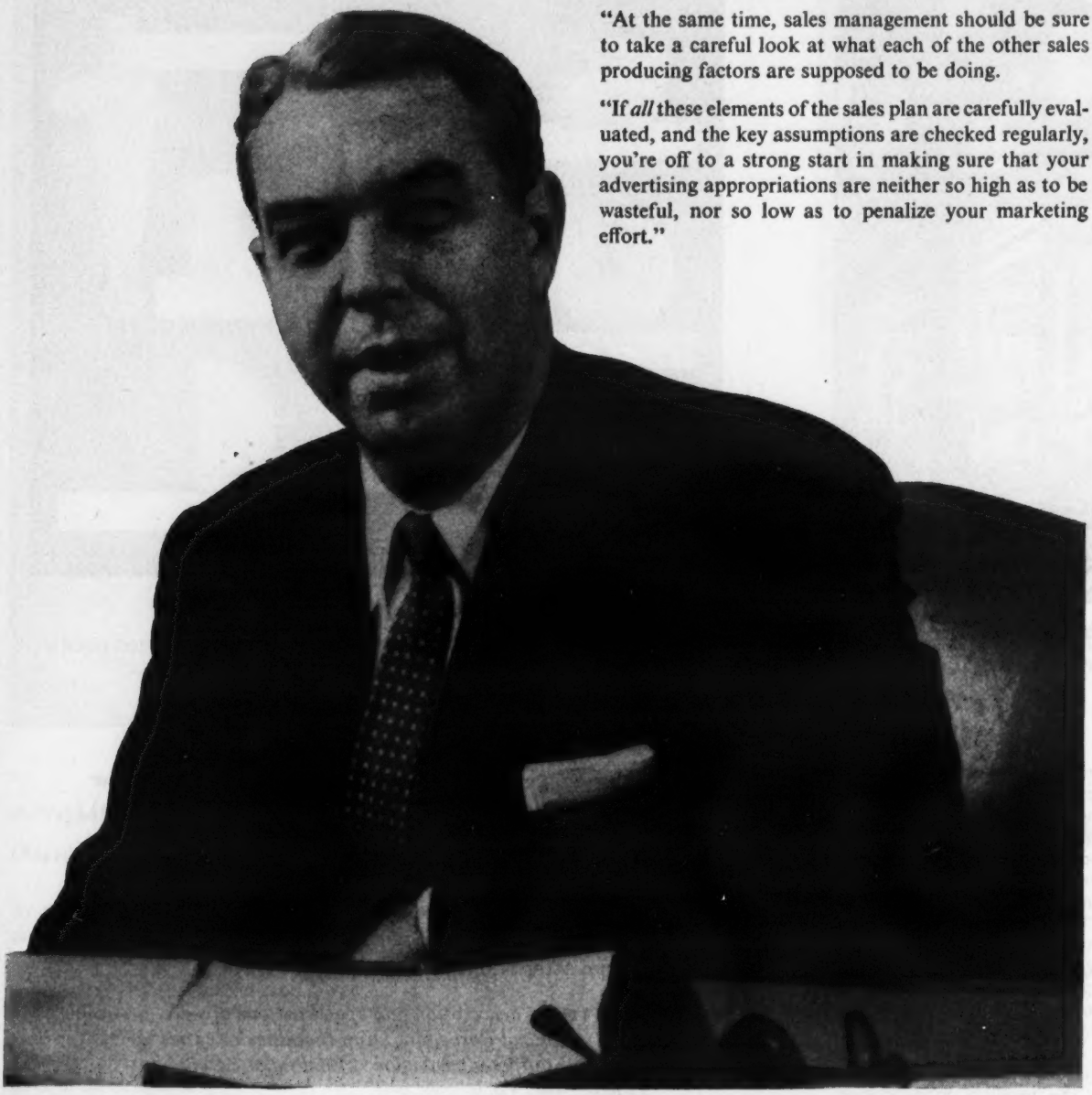
"How much is enough for advertising?"

JOHN R. SARGENT, partner in the nationally-known management consultant firm of Cresap, McCormick and Paget, points the way toward solution of one of top management's knottiest problems.

"Good sales management generally knows the crucial sales problems faced by each one of its products. Through good advertising advice plus experience, trial and error, and some judicious advertising testing, sales management also can come to have a good understanding of what advertising can and cannot do.

"At the same time, sales management should be sure to take a careful look at what each of the other sales producing factors are supposed to be doing.

"If *all* these elements of the sales plan are carefully evaluated, and the key assumptions are checked regularly, you're off to a strong start in making sure that your advertising appropriations are neither so high as to be wasteful, nor so low as to penalize your marketing effort."



AIA

ASSOCIATION OF INDUSTRIAL ADVERTISERS

271 madison avenue • new york 16, n. y. • telephone murray hill 5-8921

An organization of over 4000 members engaged in the advertising and marketing of industrial products, with local chapters in ALBANY, BALTIMORE, BOSTON, BUFFALO, CHICAGO, CLEVELAND, COLUMBUS, DALLAS, DENVER, DETROIT, HAMILTON, ONT., HARTFORD, HOUSTON, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, MINNEAPOLIS, MONTREAL, QUE., NEWARK, NEW YORK, PHILADELPHIA, PHOENIX, PITTSBURGH, PORTLAND, ROCHESTER, ST. LOUIS, SAN FRANCISCO, TORONTO, ONT., TULSA, YOUNGSTOWN.

Popularity increases for aluminum alloys in chemical field

Products are "a natural" for low temperature work

Use of aluminum alloys continues to grow in the chemical industry. The metals designated for chemical plant use have shown by actual service that they have high resistance to chemical and atmospheric attack. Reduced corrosion losses have resulted in considerable savings in maintenance bills.

Some aluminum tanks, storing glacial acetic acid, acetic anhydride and their mixtures, have already seen more than 30 years service. Aluminum roofs for sour crude oil storage tanks have been used for over 30 years in locations where steel roofs failed in less than five years.

Distillation Columns

Bubble caps made of aluminum have had 10 to 15 years service in fractionating columns processing crude oils at temperatures up to 625°F. Four month data from a test rack exposed in an ammonia still containing CO_2 and H_2S indicated corrosion rates of aluminum alloys to be less than 1 mpy, whereas mild steel completely corroded away in the same length of time.

Laboratory data shows aluminum to be resistant to boiling solutions and condensates of acrylonitrile and acrylonitrile saturated with water. Corrosion rates in all cases were less than 1 mpy after 240 hours of test.

Other chemicals being handled and stored successfully in aluminum equipment include 83% ammonium nitrate, aliphatic acids, alcohols, amines, hydrogen peroxide, fuming nitric acid, phenol, formaldehyde and high purity water.

Cryogenics

Aluminum alloys have been found to perform exceptionally well at low temperatures. Their mechanical properties — including strength, elongation, impact resistance and

ductility — actually improve as temperature drops. For example, at −320°F, tensile and yield strengths are about 40 and 20% higher, respectively, than at room temperature.

Aluminum also resists liquid air, oxygen, nitrogen, etc., and forms no explosive acetylides. Balsa-insulated aluminum tanks are now being used extensively for shipping liquid methane. One freighter has five aluminum cargo tanks carrying −258°F methane. Other cryogenic applications include use with pure hydrogen, argon, helium, anhydrous ammonia and propane.

(Condensed from paper "Corrosion Studies of Aluminum in Chemical Process Operations," by E. H. Cook, Jr., R. L. Horst and W. W. Binger, Alcoa Research Laboratories, Aluminum Company of America.)

(Further information about use of aluminum alloys in chemical field may be obtained from Aluminum Company of America, Alcoa Building, Pittsburgh, Pa.)

Check 1278 opposite last page.

Braided Teflon packing resists many acids, alkalies, solvents

Uses: Corrosion-resistant mechanical packing for pumps, valves and other devices.

Features: Teflon fiber packing provides excellent performance over wide range of temperatures in various chemical exposures.

Description: Packing consists of fine Teflon fibers braided over braided glass fiber core. Entire assembly is then impregnated with Teflon. Construction results in soft, pliable, low-friction packing.

Product withstands attack from concentrated acids such as sulfuric, nitric and aqua regia. Alkalis and solvents are also easily handled.

(Further information about Flexrock-405 Teflon fiber packing may be obtained from Flexrock Company, 3611 Filbert Street, Philadelphia 1, Pennsylvania.)

Check 1279 opposite last page.

Use Snap-Tite Valved Couplings and you'll always know when you've stopped the flow!

Use Snap-Tite valved couplings and you'll never have to test lines to see if flow has stopped as you do with conventional valves.

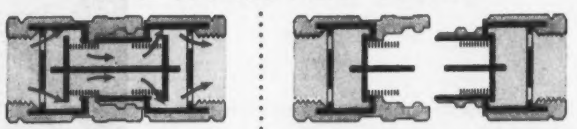
The instant you disconnect the two halves of a Snap-Tite coupling, flow stops . . . and you know at a glance the line is closed. Reconnect and right away full flow begins again.

Snap-Tite couplings take up less space, prevent the possibility of leaking valves, save time and money in installation and maintenance. Ask your local Snap-Tite representative how much you can save by using Snap-Tite couplings.

SIZES: ¼" to 6" in aluminum, brass, steel and 303 and 316 stainless. Larger sizes and other metals on special order.

For more information, write for Snap-Tite Catalog #58. Ask for the name of your local Snap-Tite representative.

TO USE SNAP-TITE VALVED COUPLING:



CONNECT—Full flow instantly

DISCONNECT—Stop flow instantly

Snap-tite

ST-59-04

UNION CITY, PA.

Check 1280 opposite last page.

Extruded Penton sheet offered for vessel lining use

Penton sheet stock designed for vessel lining applications is now available. Material is thermoplastic, in extruded sheet form 0.04" thick by 21" wide.

Product can be used to line vessels of various sizes and is

Virtually any contour can be lined with Penton

not subject to thermoshock. It has good abrasion and impact resistance.

Penton may be applied to virtually any contoured surface. The chlorinated polyether compound offers excellent resistance to many acids, bleaching agents, solvents and plating solutions. It can be used at temperatures up to 280°F.

(Further information about Penton sheet stock may be obtained from Special Products Dept., United States Gasket Company, Plastics Division, Garlock Inc., 602 N. 10th Street, Camden 1, N. J.)

Check 1281 opposite last page.

Maintenance slashed by use of castable in kraft mills

Technical report tells how a chrome castable is being used to advantage in recovery furnace bottoms. These furnaces are used for recovering sodium salts from the spent liquor after digesting as practiced in kraft mills.

It is only necessary to repair bottoms on an average of once a year. As an illustration of procedure used with good results one paper mill has

See why ALCOA ALUMINUM makes a good design habit

Requirement: metal pipe and tube to insure corrosion-free fluid handling at low initial cost and minimum upkeep

Key to good design: specify low-cost, trouble-free tubular products of Alcoa Aluminum

The overpowering volume of pipe and tubing needed in the process industries makes it one of the biggest single material investments in most plants. Historically, the repair, maintenance and replacement of piping systems has been too, one of the biggest causes of an alarming increase in maintenance costs. Both factors make vital a clear understanding of the rather remarkable advantages of aluminum pipe and tube.

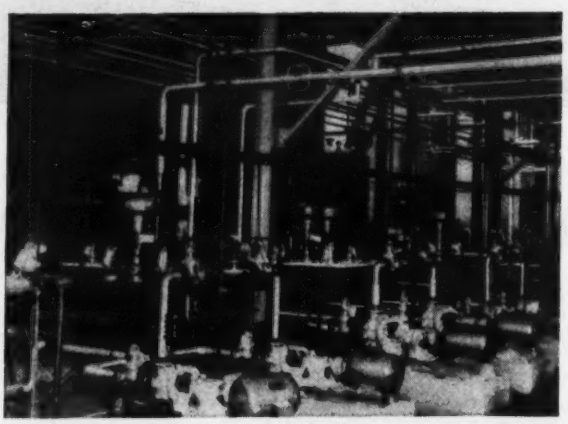
First of all, from a cost standpoint, aluminum is very frequently the lowest cost material suitable for a wide variety of applications in moving fluids through a plant. Consider, for example, the fact that the initial cost of aluminum may often average as much as 50 per cent less than that of admiralty for identical applications. Even greater savings apply when other metals such as stainless or mild steel are compared with aluminum.

Beyond these initial cost savings, aluminum provides significant maintenance benefits. For instance, no other commonly used metal offers aluminum's great resistance to corrosion. And the corrosion resistance for specific alloys exposed to particular environments can be determined from a substantial body of factual service data accumulated by ALCOA over the past 40-odd years.

It is hardly surprising that aluminum, in a variety of tubular forms, is gaining the confidence of more and more designers and builders in the process industries . . . as suggested by the aluminum applications described on these pages. ALCOA's engineers are anxious and willing to share their factual knowledge of aluminum which inspires this confidence. They are doing so through a series of engineering conferences being held this year in major cities around the country. Your local ALCOA sales office will be happy to furnish details.

You may also wish to avail yourself of the body of ALCOA literature which describes in technical detail the known performance characteristics of aluminum in a variety of process industries applications. Simply fill in and mail the coupon opposite.

World wide sales through ALCOA INTERNATIONAL, INC., 230 Park Avenue, New York 17, N.Y.

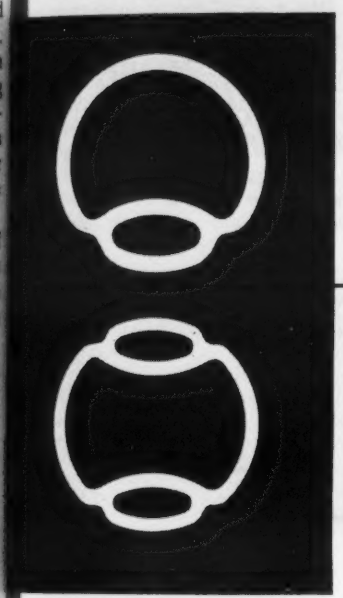


Process piping of Alcoa Aluminum is shown here in a system designed to handle liquid sugar. The natural corrosion resistance of aluminum prevents contamination of the syrup, insures long service life and prevents excessive maintenance. Its scavenging action reduces undesired heavy metal contamination, thereby improving the end product. And aluminum's low friction factor permits fast flow without excessive pumping costs.

This aluminum pipeline is shown being welded and laid in Lake Maracaibo, Venezuela. Aluminum—without special coatings—has proved highly suitable for this operation because it resists so well the corrosive attack of the brackish waters in the lake. Since no coating is required, the low initial cost of the aluminum has proved a significant benefit. The light weight of the aluminum pipe speeded laying operations, and it has no vulnerable coating which would require babying the pipe.

Alcoa Aluminum jacketing keeps the thermal insulation on these large diameter steam lines fully effective. The light, bright aluminum jacketing shields over 5½ miles of piping and insulation from rain, snow, dirt and ice while providing effective protection against a highly corrosive industrial-marine atmosphere.

New UNISTRENGTH® pipe by Alcoa now makes it possible to design low-cost welded aluminum lines with uniform bending, bursting and tensile strength throughout their length. The secret is a reduction in wall thickness everywhere but at the ends where it is needed to overcome the local reduction in strength caused by the heat of welding. The result is aluminum piping which weighs up to 40% less but provides equivalent design strength.



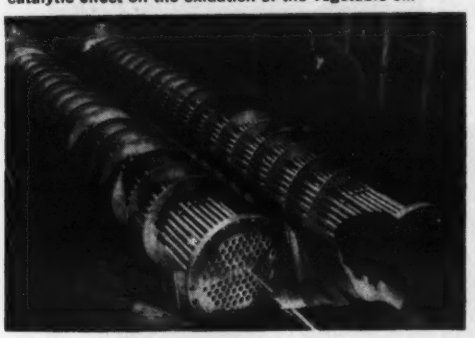
Alcoa UNITRACE® is the light, strong, corrosion resistant pipe which provides steam and product passages in a single extruded unit. It has proved an excellent way to cut cost and improve the efficiency of steam traced lines—by eliminating costly external steam jackets or inefficient tracer tubes. Now a new product,

Alcoa DUOTRACE* makes possible the same important benefits in steam traced systems where recirculation is desirable. As shown, DUOTRACE provides two trace passages plus the product passage in one extruded unit. Flange and Trace Cap fittings compatible with conventional piping are available for both UNITRACE and DUOTRACE.

Design Note: Consider UNITRACE and DUOTRACE as low-cost successors to both heat exchangers and preheaters.

*Trademark of Aluminum Company of America

Alcoa Aluminum heat exchanger tubing is frequently the lowest cost material with suitable corrosion resistance for a variety of heat transfer applications. Moreover, aluminum frequently displays significant extra benefits—as in this pair of aluminum oil-to-oil exchanger bundles for preheating vegetable oils. Here, the aluminum alloys have no catalytic effect on the oxidation of the vegetable oil.



ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

For exciting drama watch "ALCOA PRESENTS" every Tuesday, ABC-TV, and "ALCOA THEATRE" every alternate Monday, NBC-TV

Aluminum Company of America, 872-L Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries:

- ☐ 10197 Aluminum Pipe and Fittings
- ☐ 34-10418 Alcoa Unitrace: Combines Piping and Tracing in One Unit
- ☐ 10270 Alcoa Utilitube
- ☐ 10460 Process Industries Applications of Alcoa Aluminum
- ☐ 20849 Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres
- ☐ 20265 Have You Tried Aluminum in Your Refinery?
- ☐ 20437 Aluminum Alloy Heat Exchangers in the Process Industries
- ☐ 20272 Aluminum Alloys for Handling High Purity Water
- ☐ 21090 Resistance of Aluminum Alloys to Fresh Waters
- ☐ 10130 Forming Alcoa Aluminum
- ☐ 19416 Brazing Alcoa Aluminum
- ☐ 19415 Welding Alcoa Aluminum
- ☐ 19051 Alcoa Aluminum Handbook

Name_____

Company_____

Title_____

Address_____

City_____

State_____

Check 1282 opposite last page.

adopted the practice of gunning the castable to within 4½" of desired height. A single course, 4½" thick, of Chromex brick (chemically bonded chrome-magnesite refractory) is then laid. For annual repairs, eroded brick is replaced and minor repairs made to castable.

Chrome castable can be readily gunned into place, requiring minimum of time. Castable can be placed in service 12 hr after installation has been completed. Designated procedures must be followed during installation to achieve desired results.

(H-W Chrome Castable is product of Harbison-Walker Refractories Company, Farmers Bank Bldg., Pittsburgh 22, Pennsylvania.)

Check 1283 opposite last page.

Teflon solenoid valve withstands corrosive, abrasive attack

Corrosion-resistance solenoid valves, having bodies molded to Teflon, are on the market. Units are chemically

Teflon body on solenoid valve permits use in tough corrosive applications

inert, withstand abrasion and are shock-resistant. Valves are designed for normally closed use in conventional AC and DC voltages.

(Teflon solenoid valves are product of Valcor Engineering Corporation, 365 Carnegie Avenue, Kenilworth, New Jersey.)

Check 1284 opposite last page.

PROBLEM:

HANDLE SARAN RESIN IN BULK
WITHOUT DANGER OF CONTAMINATION

SOLUTION:

USE PROVEN U.S. SEALDBIN CONTAINERS

Loading Saran into U.S. Sealdbins in a completely closed system guarantees protection from outside contaminates.

Rugged U.S. Sealdbins are their own weather-resistant, hermetically sealed warehouses — unaffected by exposure.

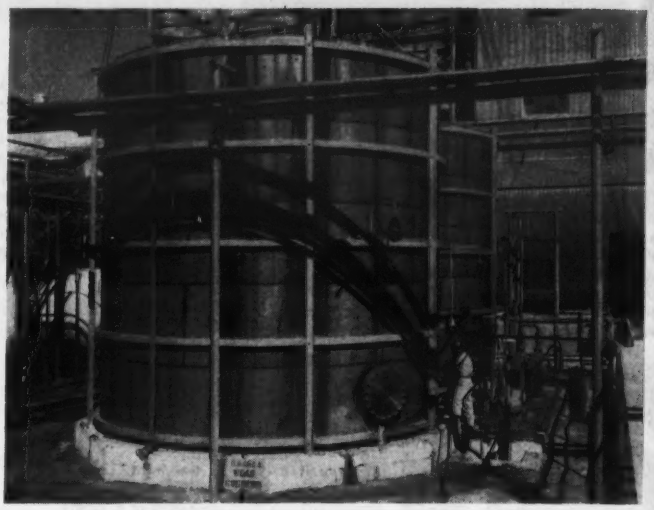
Transferred indoors, U.S. Sealdbins are unloaded in a completely closed system. From filling, to storage, to emptying, Saran Resin remains free of contamination.

Pictured above, U.S. Sealdbins are handling Saran Resin at Dow Chemical Company's Midland, Michigan, plant. Made of high-strength cord fabric and custom-compounded synthetic rubber, U.S. Sealdbins are rated tops in weather and corrosion resistance. Collapsible, they can be returned in but a fraction of their outbound space. Find out how much time, labor and money U.S. Sealdbins can save in your operation. Write, wire or phone

US RUBBER

TRANSPORTATION PRODUCTS DEPT.
United States Rubber
10 Eagle St., Providence, R. I., DExter 1-4000

Check 1285 opposite last page.



Stainless steel tanks are used to store nitric acid at Phillips Chemical Company's Cactus plant. Vessels resist corrosion, safeguard product purity

Temperature variations don't make much difference — time-tested service proves that stainless steel tanks are . . .

A good way to store 52-55% HNO_3

They resist corrosion and safeguard quality.

These words just about sum up the job that two 47,000-gal-capacity stainless tanks are doing at the Cactus plant of Phillips Chemical Company. Used to store 52-55 percent nitric acid, tanks are constructed of hot-rolled, annealed and pickled, type-347 stainless steel. Sheet is No. 12 gage. Welding rods used in the fabrication were type 347 and 310 electrode.

The plant is located at Etter, Texas. It produces about 142,000 tons of ammonium nitrate per year. Since nitric acid is a constituent for the end product, any dissolved corrosive products in it would affect final purity.

The acid is transferred to the storage tanks through an uninsulated line. Temperatures range from −20° to 100°F. Storage is at atmospheric pressure.

There has been practically no maintenance on the tanks since their installation in 1949. One leak was located in a weld during a routine inspection in May of 1956. This was detected using vacuum-soapsuds method. Routine welding quickly repaired the leak.

Instrumentation on tanks consists of level indicator recorder for each vessel. Tanks have individual unloading pumps but are loaded from common header. All lines entering and leaving the storage tanks are made of stainless steel.

(Further information about stainless steel used in these tanks may be obtained by checking No. 1286 opposite last page.)

Tough epoxy coating applied quick, easy by spraying

Uses: Protecting pipe, fittings, supports and other objects from corrosion.

Features: Tough, thin epoxy coating provides effective corrosion protection. It cures in less than 60 seconds. Spray technique permits easy and economical application.

Description: Coating is a one-part powdered 100 percent epoxy resin. When cured, it is completely thermoset and will not flow under elevated pressure or heating.

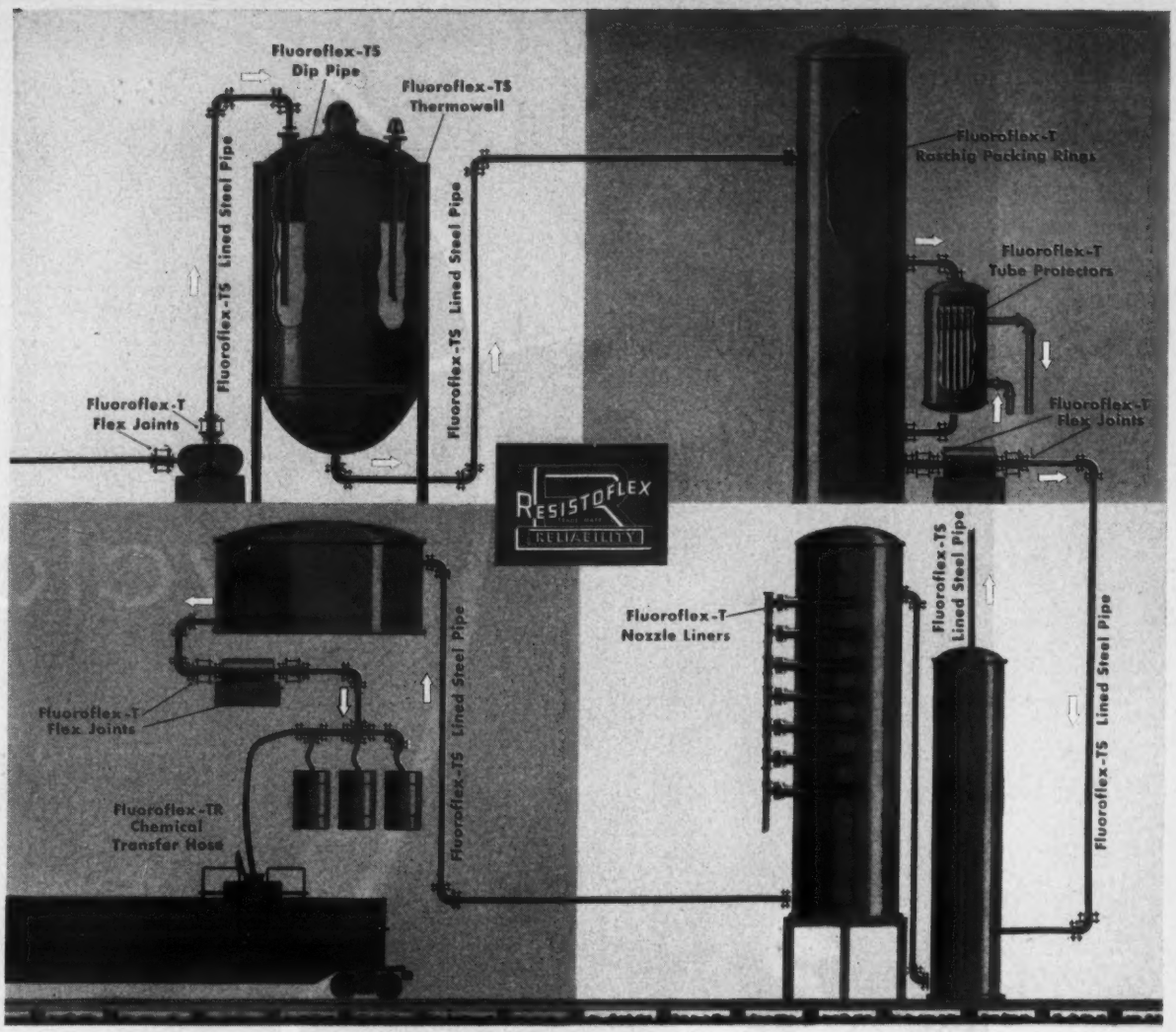
Product has adhesion strength of more than 3000 psi, high impact resistance and resists attack by most chemicals, including hydrocarbons such as fuel oil, gasoline, kerosene and sweet or sour crude. Typical resistance value of 10 mil coating is 10,000 megohms per sq ft.

Epoxy coating being applied to heated part by means of spray gun. Resin flows evenly, cures in less than 60 seconds

Equipment needed for application includes flocking gun, heating unit, means of cleaning parts to be coated, air source, spray booth and (optional) dust collector. Any oven or other heat source which will heat the article to be sprayed to 425-450°F is suitable. Surface to be coated must be thoroughly cleaned by sand or shock blasting or use of solvents or pickling. For spraying, minimum of 40 psi air pressure is suggested.

(Scotchkote brand protective resin No. 101 is product of Minnesota Mining and Manufacturing Co., 900 Bush Avenue, St. Paul 6, Minnesota.)

Check 1287 opposite last page.



HERE'S WHY corrosion-proof fluid-handling components of FLUOROFLEX-T (TEFLON) assure production savings, non-contamination:

Fluoroflex®-T Piping Products as shown above can be used with complete and proven assurance that they will not corrode or build up solids which can contaminate sensitive products. Specially processed of Teflon® resins by patented Resistoflex methods, they can handle the most difficult materials up to 500°F. They are completely resistant to any chemical except high-temperature fluorine and the molten alkali metals.

Fluoroflex-T Piping costs no more on an installed-cost basis than other corrosion-proof systems in common use today. Initial material costs have been lowered by recent price reductions made possible by advanced technology and increasing volume. Installation costs are inherently low as a result of skillful design which features easily-bolted-together units with prefabricated, flanged sections.

Fluoroflex-T Piping costs LESS on a performance basis. Savings in operation are assured—with decreased maintenance, long service life, and the elimination of process headaches and downtime.

So, if *you* have problems of corrosion—want to reduce maintenance or replacement costs and eliminate process downtime or product loss—consult Resistoflex. Write for more information today.

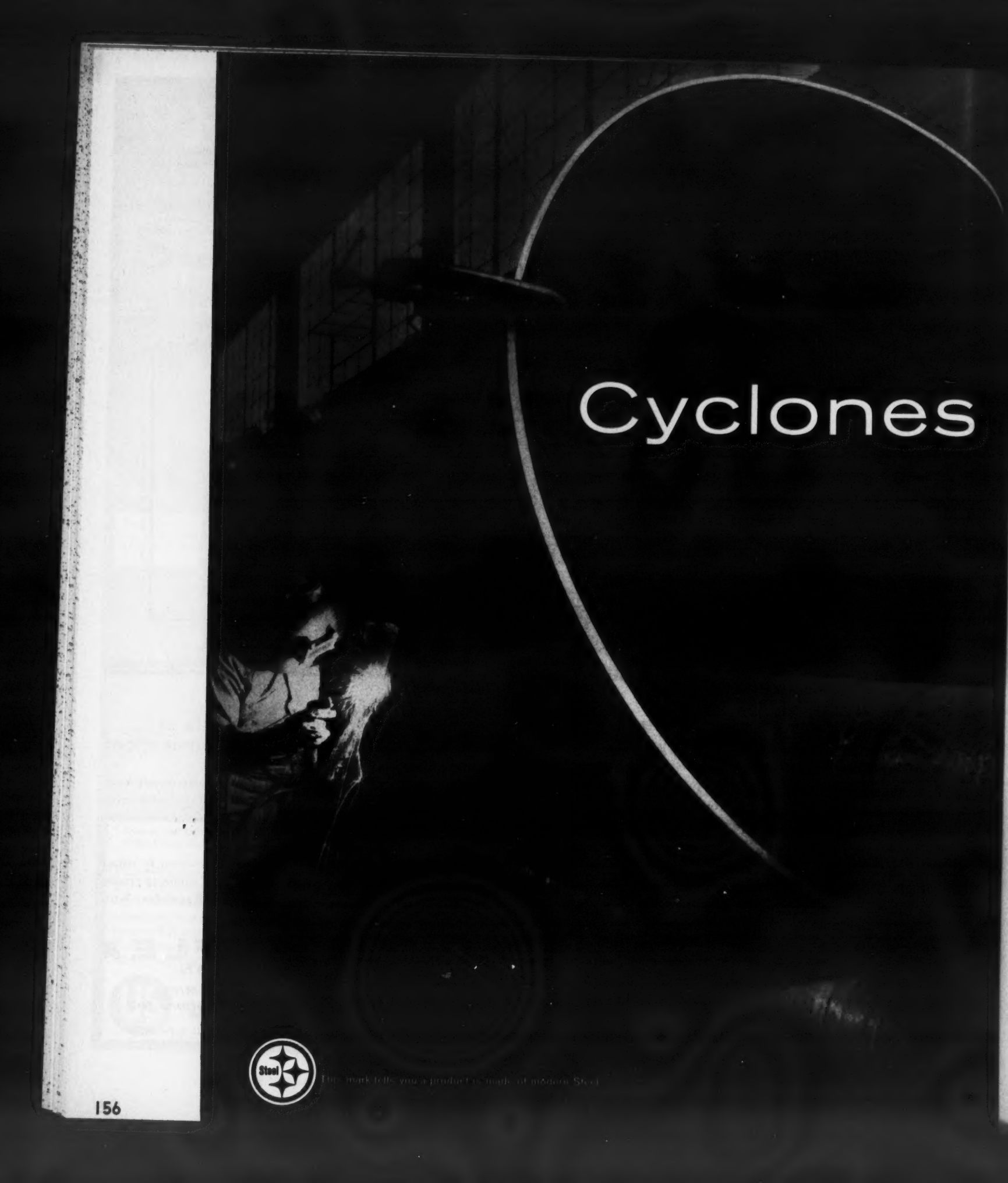
RESISTOFLEX CORPORATION

Complete systems for corrosive service

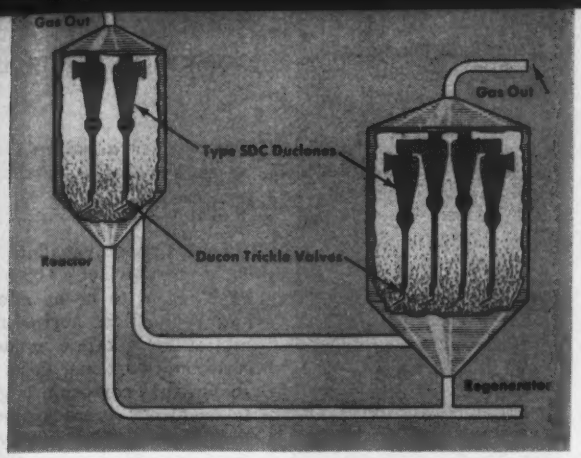
Plants in Roseland, N. J. • Anaheim, Calif. • Dallas, Tex.
Sales Offices in major cities

•Fluoroflex is a Resistoflex trademark, reg. U. S. Pat. Off.
•Teflon is DuPont's trademark for TFE fluorocarbon resins.

Check 1288 opposite last page.



This mark tells you a product is made of quality Steel



General arrangement of Ducon cyclones in the reactor and regenerator of a fluid catalytic cracking unit. Stainless cyclone collectors keep catalyst loss to a minimum. "Duclone" is a registered trademark of the Ducon Co.

s start here...

. . . and end up in fluid bed cat crackers where they circulate up to 60 tons of catalyst every minute. At $400 to $500 a ton, lost catalyst can put a lot of red ink into a refinery's operating budget. Breakdowns cost from $20,000 to $50,000 a day. That's why it is so important to design with the right material from the start: USS Stainless Steel.

Stainless Steel cyclones used for catalyst recovery are subjected to extreme heat and erosion. Temperatures in a regenerator unit can go as high as 1400° F. At high temperatures elemental sulfur corrosion would eat out most materials in nothing flat. Not Stainless. And Stainless Steel retains its strength at high temperatures. Stainless cyclones aren't in danger of changing shape which could cause catalyst loss.

Nothing equals Stainless Steel as a solution to the many complex problems in a refinery. It has outstanding corrosion resistance for a wide range of reagents, excellent high temperature strength. Its smooth, dense surface won't harbor contamination, is easy to clean. Above all, USS Stainless Steel promises long life and low maintenance. Order USS Stainless Steel through your USS representative or your local Steel Service Center.

If you are interested in more information about these Stainless Steel cyclones, wire or write U.S. Steel, Room 6104, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

Left, welder completes longitudinal seam of one segment of the cyclone at The Ducon Company's Mineola, N.Y. plant. **Below,** stainless steel cone is removed from the forming rolls.

USS

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

ILLUSTRATED:
1" SIZE
SIZE RANGE:
¼" TO 6"

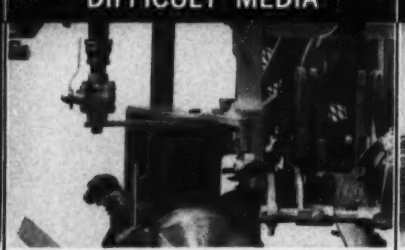
THE
ECON-O-MISER
BALL VALVE

COMPACT PIPING LAYOUT

Here are 19 Econ-O-Miser Ball Valves compactly installed on this paint blending manifold. Note the absence of unions . . . this valve is both a valve and a union! The Econ-O-Miser is smaller, easier to install . . . just right for modern piping layouts, where equipment must fit into tight areas.

Let us show you . . . in your own plant! Write us about your limited space problems!

DIFFICULT MEDIA



The Econ-O-Miser Ball Valve successfully controls the flow of cold glue with a viscosity of molasses, on the WORLD Tandem Labeler manufactured by Economic Machinery Co. Clean wiping action, positive leakproof shut-off, and smooth round flow, make the Econ-O-Miser ideal for handling difficult media.

Let us show you . . . in your own plant! Write us about your media problems!

TROUBLE-FREE OPERATION

Outdoor propane and butane storage tanks in remote field processing plants require dependable positive shut-off valves on bleed lines. The unique features of the Econ-O-Miser Ball Valve provided the practical answer . . . no lubrication . . . no metal-to-metal contact . . . quick visual ON-OFF indication . . . trouble-free service.

Let us show you . . . on your outdoor applications! Write us about your valve maintenance problems!

COMPARE . . . THE ECON-O-MISER BALL VALVE

NO UNION NECESSARY

WORCESTER VALVE CO., INC.
16 PARKER STREET, WORCESTER, MASS.

Check 1289 opposite last page.

Cut corrosive action of MEA solutions with $NaVO_3$

Sodium metavanadate in a concentration of 0.05% has been found to be an effective and economical corrosion inhibitor for alkaline amine gas scrubbing systems. Tests have shown that corrosion is greatly reduced as measured by iron capacity test and by rate data compiled as mils per year.

The sodium metavanadate dissolves easily in hot water and can be quickly added to the gas scrubbing system. Nasal irritation is avoided during loading by use of a nose and mouth mask.

Concentration of vanadium in amine solution should be determined periodically after system is functioning. Make-up quantities should be added to maintain the 0.05% concentration. Addition at startup of from 2 to 2½ times the required amount of sodium metavanadate will insure formation of a good protective coating.

(Further information about use of sodium metavanadate as corrosion inhibitor may be obtained from Vanadium Corporation of America, 420 Lexington Ave., N.Y. 17, N.Y.)

Check 1290 opposite last page.

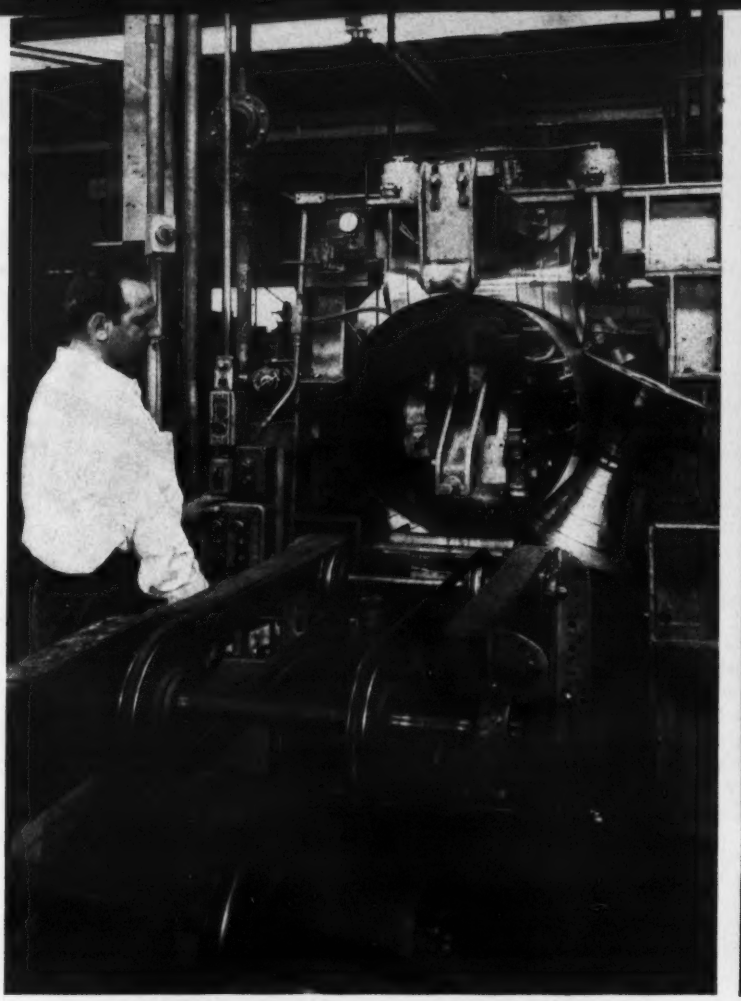
New theory presented for corrosion of iron

Trouble-maker believed to be hydrogen present in water

Hydrogen ions, rather than electrochemical reactions, may be the big culprits responsible for corrosion of iron. Recent experiments conducted at Westinghouse research laboratories indicate that hydrogen particles present in water penetrate the iron and enlarge the sites at which oxygen normally combines with the metal. This spreads the oxidation reaction throughout the surface of the iron, causing it to corrode.

In the tests, pure iron wires

To page 160



10:00 a. m. *Order received and processed—steel begins to move, is formed into cylinder, feeds into automatic welder. Next—fabrication of lids, bottoms; then painting, drying, inspection.*

10:58 a. m. *Full tractor trailer load—200 standard 55-gallon drums—can be completed in less than one hour from receipt of order. When essential, this rush service is available to you.*

1/1000

Perhaps once in a thousand orders you *really* need rush delivery of drums. And from J&L you can get it.

For example, not long ago a large oil company had an emergency call from a good customer. In less than an hour, their nearest J&L plant produced 200 standard 55-gallon drums; fabricated, painted, dried, and loaded onto a tractor trailer, ready for fast delivery.

In an emergency, J&L can offer you rush service, too. Normal delivery is more than adequate for most situations. But when the situation is *really urgent*, we're glad to cooperate. There are *nine* J&L container plants spotted around the country. All are near major trucking and rail centers. All are prepared to offer you fast, dependable service on the complete J&L line of quality steel drums and pails.

For the whole story on J&L's complete line of standard and lined drums and pails, write for *free* booklet today!

Steel

For more information on product at right, specify 1291 see information request blank opposite last page.

J&L STEEL

Jones & Laughlin Steel Corporation

CONTAINER DIVISION • 3 GATEWAY CENTER • PITTSBURGH 30, PENNSYLVANIA

ATLANTA 1, GEORGIA
1280 Chattahoochee Avenue, N.W.
P. O. Box 1452—SY 4-8251

BAYONNE, NEW JERSEY
Constable Hook Road
P. O. Box 107—HE 6-9100

CLEVELAND 5, OHIO
8806 Crane Avenue
MI 1-2000

KANSAS CITY 15, KANSAS
Funston & Chrysler Roads
FA 1-1212

LANCASTER, PENNSYLVANIA
Manheim Pike and Steel Way
EX 4-4091

NEW ORLEANS 21, LOUISIANA
P. O. Box 10056, Jefferson Branch
5008 Jefferson Highway—VE 3-6352

PHILADELPHIA 37, PENNSYLVANIA
3711 Sepviva Street
JE 5-3100

PORT ARTHUR, TEXAS
Sabine Highway, P. O. Box 31
YU 5-5567

TOLEDO 1, OHIO, City Park and Hamilton Street, CH 1-6241

From page 158

about as thick as a fine sewing thread were reacted with oxygen at 835°F under closely controlled conditions.

With dry oxygen the iron formed a protective oxide coating from which grew billions of tiny round oxide whiskers less than one millionth of an inch in diameter and 30 millionths of an inch high. Each whisker grew from a single growth site on the wire's surface.

The wires were then reacted under the same conditions except that water vapor was substituted for dry oxygen. A startling change took place in the oxide surface.

Thin, pointed, blade-shaped platelets of iron oxide erupted from the growth site and spread across the metal surface. Each was about one-millionth of an inch thick, 30-millionths of an inch wide and 300-millionths of an inch high.

As they grew in size, they spread more than 50 times in area over the sites observed for dry oxygen alone, reaching a density of nearly one billion per square inch of surface area.

The amount of rust present was about 250 times that which formed when moisture — and the hydrogen ions it releases — were absent.

It was found that less than one part water vapor in 200 parts of dry oxygen atmosphere will cause the blade-shaped crystals to form. At room temperature, this corresponds to relative humidity of about three percent.

(Information courtesy of Westinghouse Electric Corporation, Box 2278, Pittsburgh 30, Pa.)

NEXT MONTH

Epoxy coatings applied "on the go" are proving that they can take it at Mineral & Chemicals Corporation's kaolin plant. Downtime is at a premium — three coats are applied in only two days. They withstand acid attack and safeguard product quality. Look for the story next month.

CHEMPRO SQUARE-BRAIDED TEFLON* PACKINGS

Chempro Square-Braided Teflon Packings are tough, strong and chemically inert. They outlast ordinary braided packing many times over, holding together longer against even the strongest acid, alkali or organic solvent. Here are four popular Chempro Square-Braided Teflon packings:

STYLE No. 400 PACKING Constructed of pure Chempro tape, braided square without lubrication. For highly corrosive services where a lubricant is undesirable.

STYLE No. 400-F PACKING Resilient, square-braided packing of Chempro Teflon multi-filament yarn, without lubrication. For pump and valve applications in highly corrosive services where the packing must "give" to a certain extent.

STYLE No. 400-FI PACKING Square-braided packing of Chempro Teflon multi-filament yarn and impregnated with Teflon suspensoid. This dense packing was developed for gas and vapor services where other lubricated packings were not acceptable.

STYLE No. 400-FL PACKING Made by square braiding Chempro Teflon multi-filament yarn and externally lubricating with a non-hardening and non-melting lubricant. Recommended for high speed applications and highly corrosive services, from freezing to 350° F.

These Chempro Braided Teflon packings are available in all sizes in standard 1/16" increments from 1/8" to 3/4" square—in spool or coil forms. Can be cut to specific ring sizes, if desired.

Write for revised Bulletin CP-552.

*duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

9 Broadway, New York 4, N. Y.

Check 1292 opposite last page.

KNOX Tower Packings

Raschig Ring
Single-Partition Ring
CHECK ✓ THESE FEATURES
• KNOX Tower Packings resist high temperatures, fumes, vapor, corrosion.
• Resistant to alkalis, acids, liquids.
• Complete vitrification firing provides zero porosity, assuring indefinite life chemically.
• Uniform quality, high chemical purity, iron free, great mechanical strength, will not crumble.
Cross-Partition Ring
If you're interested in better Tower Packings at lower operating costs, we will be glad to send more information. Prices and samples on request.
Adequate stocks are maintained for any emergency.
Tellerette
Berl Saddle
IRON FREE
Always Specify KNOX Tower Packings
KNOX PORCELAIN CORPORATION
KNOXVILLE 1, TENNESSEE

Check 1293 opposite last page.

WE WEAVE ACCURATE "WORKING OPENINGS"

IN WOVEN WIRE SCREEN AND WIRE CLOTH PRODUCTS

Whether you are grinding, sizing, scalping, dewatering or filtering it's the accuracy of the "working opening" that makes the difference in woven wire screen and wire cloth products. We pride ourselves in weaving accurate "working openings", an engineered screening surface to meet your specification.

First, the best metal or alloy is selected—hard enough to withstand the abrasive action—ductile enough not to break under stress. Next, the best wire diameter and crimp are determined. Then we weave wire screen or wire cloth around accurate "working openings" best suited for your screening application.

FREE! Write for bulletin 160 giving complete details and facilities.

THE CLEVELAND WIRE CLOTH & MFG. CO.

3577 EAST 78th STREET • CLEVELAND 5, OHIO

Check 1294 opposite last page.

NEW LITERATURE
Corrosion Control

Corrosion-resistant exhaust systems fabricated from PVC, polyethylene and polypropylene are described in seven-page brochure —Industrial Plastic Fabricators, Inc.

Check 1295 opposite last page.

Aluminum paint that filters out heat-creating infrared rays and stops glare is discussed in four-page bulletin. Product permits 94% of natural light to pass. Cat "Skyco No-Glare" —The Skybryte Company.

Check 1296 opposite last page.

Mastic coatings and what goes into them is told in bulletin. Applications and limitations of products are discussed. Proper surface preparation is also explained. Bul M-1 —Emjay Maintenance Engineers.

Check 1297 opposite last page.

Epoxy-phenolic lined water heaters and benefits that can be realized through their use, are covered in two-page bulletin. Linings resist temperatures in excess of 350° F. Bul 410—Sellers Engineering Company.

Check 1298 opposite last page.

Properties, uses and chemical resistance of rigid PVC tube are summarized in four-page bulletin. Chart lists performance with 45 chemicals. Bul "Extron Tuff-Tube" —Extron Corporation.

Check 1299 opposite last page.

Manufacturer's facilities for producing stainless steel plate, forgings, vessel heads and other products are pictured in 12-page brochure. Engineering services are also outlined. Brochure "Producing Stainless Steels"—G. O. Carlson Inc.

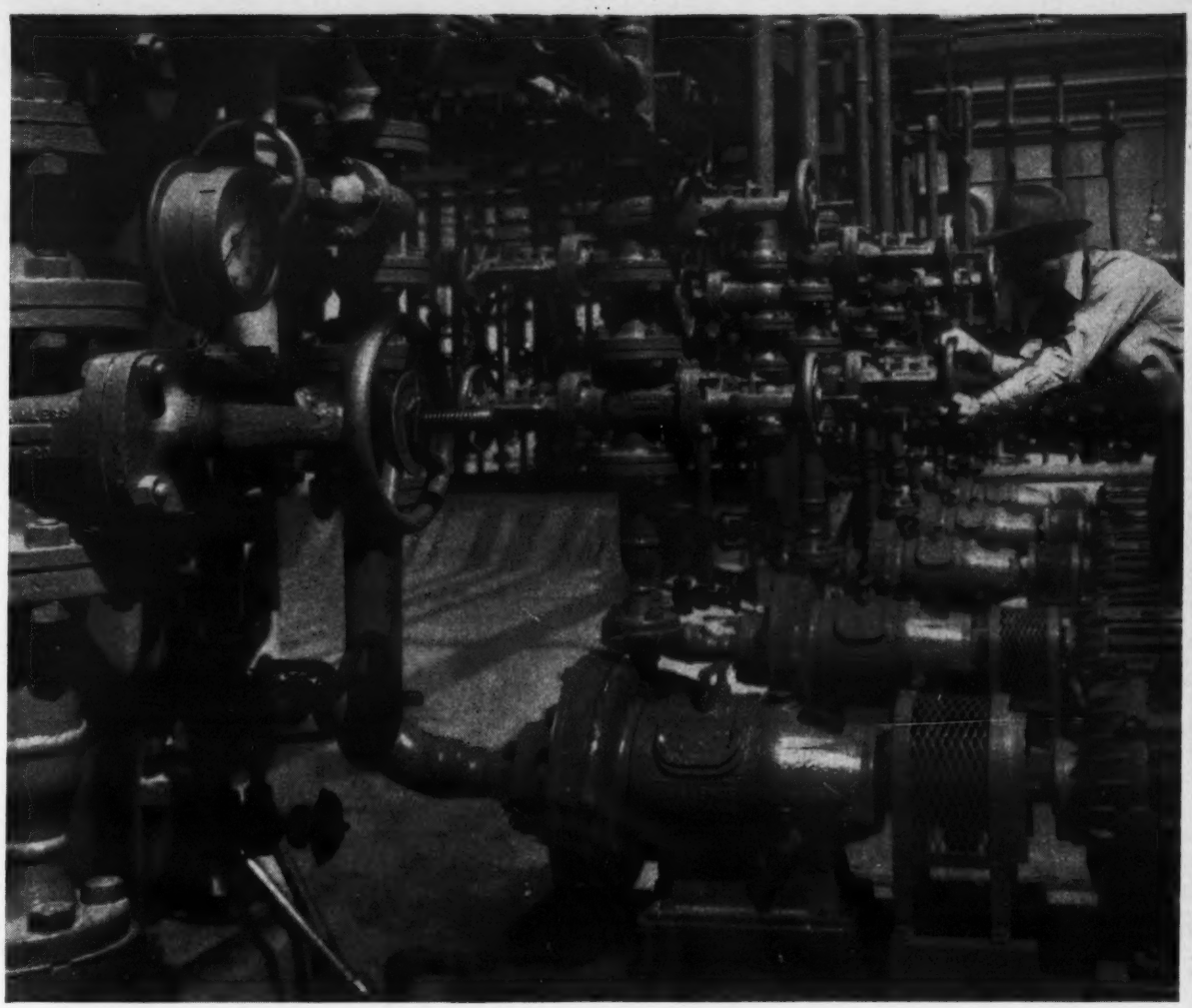
Check 1300 opposite last page.

What to know about finned tube is told in four-page bulletin. Specifications are listed for four nominal sizes ranging from ⅝ to 1" OD. Tube can be manufactured from 13 different alloys. Bul "Wolverine Trufin"—Wolverine Tube, Division of Calumet & Hecla, Inc.

Check 1301 opposite last page.

Oil-soluble, non-metallic corrosion inhibitor that has no adverse affect on lead-bearing surfaces is described in five-page Bul "At pet-80"—Atlas Powder Company.

Check 1302 opposite last page.



Ni-Resist irons: best "life insurance" yet for pump parts that live with H_2SO_4

Impellers cast from Ni-Resist* iron mean longer life for these pumps – moving a daily volume of concentrated sulfuric acid.

Maybe sulfuric acid isn't your problem. But if acids, alkalis or corrosive waters threaten your equipment, Ni-Resist irons may provide your answer.

With their high Nickel content and austenitic structure, Ni-Resist irons offer a unique combination of advantages:

They resist corrosion and erosion from high-velocity flow of caustics, chlorides, fatty acids . . . from corrosive slurries or wet steam.

They resist wear, extend effective life of valves, seals, impellers and other parts exposed to heat and metal-to-metal abrasion in corrosive media.

They reduce fabricating costs too, because Ni-Resist irons provide needed properties in economical *cast* form. Pipes, kettles, vessels, filter components and many other simple or complex shapes are produced at moderate cost, are easily machined and welded.

Get the full story of Ni-Resist irons in the 70-page booklet, "Engineering Properties and Applications of Ni-Resist Irons." 105 applications are described, and some may surprise you! Write today.

*Registered trademark

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N.Y.

NI-RESIST
NICKEL MAKES CASTINGS PERFORM BETTER LONGER

Check 1303 opposite last page.

ENGINEERING PERSPECTIVE
THROUGH A

VENTURI

Venturi tubes were first used for measuring fluid flow. While this application has increased substantially, the use of the Venturi in important unit process operations has increased even more. A Jet-Venturi combination is literally the heart of many important manufacturing processes.

JET REFRIGERATION
JET COMPRESSORS
JET CONDENSERS
JET HEATERS
JET PUMPS
JET MIXERS
JET REACTORS
JET ABSORBERS
JET FUME SCRUBBERS
SPECIAL JET VENTURI UNITS

During the first several years of the forty-two year history of our firm, we specialized entirely on steam jet vacuum pumps (ejectors). Many thousands of these are in service throughout the country and in most foreign countries. Our tradename, EVACTOR, is an important word in engineering circles. While steam jet vacuum pumps are still our major item, other applications of Jet-Venturi equipment are increasing constantly. With the exception of closely related products such as barometric condensers, CHILL-VACTORS, and CONVACTOR* systems, all of our activity is directed to the one purpose of making Jet-Venturi units more efficient, more dependable, more economical, and to apply them to an increasing number of industrial applications.

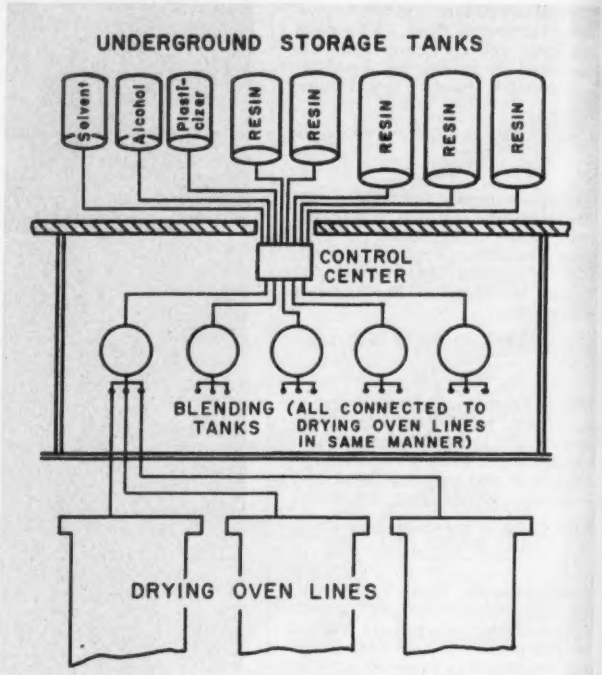
* The CONVACTOR is a dual condensing system for economic and efficient recovery of high boiling components from water vapor.

Croll-Reynolds Co., Inc.

Main Office: 751 Central Avenue, Westfield, N. J.

CHILL-VACTORS® • Steam-Jet EVACTORS® • Aqua-VACTORS® • Fume Scrubbers • Special Jet Apparatus

Check 1304 opposite last page.



Simplified sketch of underground-storage and liquids-handling system at Northern Plastics Corporation

Safety and production flexibility reap fat rewards from liquids-handling system

Labor and time savings have also accrued from set-up which delivers impregnating materials to coating machines from underground storage tanks in production of laminated plastic sheets at Northern Plastics

Northern Plastics Corporation of La Crosse, Wisconsin, achieved a 35% production-capability boost last year by means of a $150,000 plant and equipment expansion. An important part of this program was the construction of a system to store solvent, alcohol, plasticizer and resins in underground tanks . . . and move them through blending tanks to wet ends of coating machines in production of laminated plastic sheets.

Since it has been in operation this set-up has provided four-fold benefits: elimination of heavy labor, greater flexibility in preparation of formulas and quicker change-over in production runs, increased safety margin, and better plant housekeeping.

System Operation

Storage and handling arrangement is illustrated in drawing. Storage tanks are located underground to facilitate filling and to increase safety factor. Tank capacities are as follows (for single tanks): solvent, alcohol and plasticizer tanks — 5500 gal, small resin tanks — 7500 gal, large resin tanks — 9000 gal.

Any of these components may be

moved by centrifugal pumps to the control center. Here, proper component batching is accomplished by means of flowmeters with automatic shut-offs. The flowmeters are located on each component line leading into control center.

From here, the mixture may be sent to any one of five blending tanks. These tanks are elevated to provide gravity flow of blended formulas to any one of three wet ends of coating machines in drying-oven lines. (For clarity, drawing shows pipe running from only one of the blending tanks to drying-oven lines. Remaining four tanks are connected to three lines in same manner.)

Pumps have explosion-proof motors. Mixing in blending tanks is performed by air-motor mixers. All pipe is so arranged that it can be flushed and cleaned out with solvent whenever necessary.

(Flowmeters are product of Neptune Meter Company, 19 W. 50th St., New York 20, New York.)

Check 1305 opposite last page.

(Some centrifugal pumps in this installation are product of Wayne Pump Company, Division of Symington Wayne Corporation, Herbert, Riverbend & Griffin Streets, Fort Wayne, Ind.)

Check 1306 opposite last page.

(Other of these centrifugal pumps are product of Viking Pump Company, George & Wyth Sts., Cedar Falls 1, Iowa.)

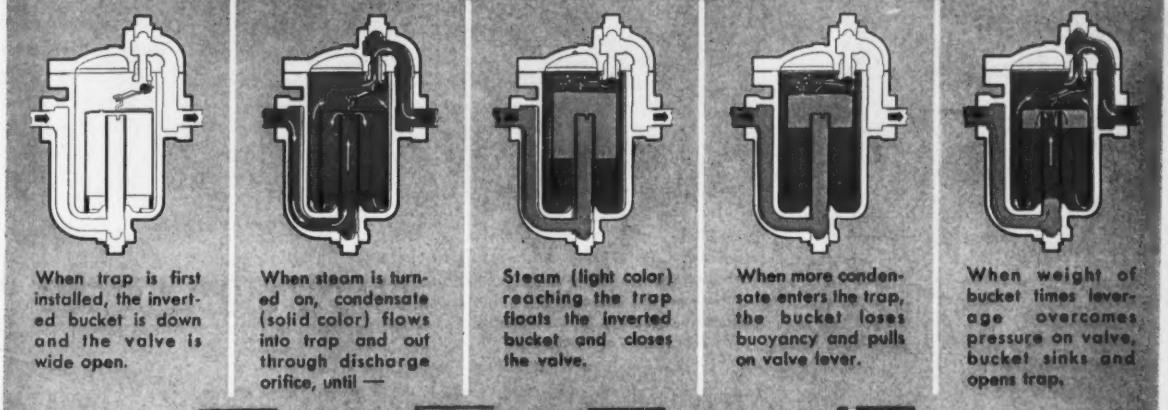
Check 1307 opposite last page.

Solid PVC ball valves added to basic line

A line of solid PVC (Type I, normal-impact) ball valves have been added to a basic line. Sizes range from ½ through 2" in screwed-end and socket-end (solvent-weld) connections for standard plastic or metal pipe. Seats are made of Teflon or Buna-N.

Valves will handle gases,

This simple trap operating principle provides the efficiency, dependability and freedom from maintenance necessary for the most profitable use of steam


When trap is first installed, the inverted bucket is down and the valve is wide open.
When steam is turned on, condensate (solid color) flows into trap and out through discharge orifice, until —
Steam (light color) reaching the trap floats the inverted bucket and closes the valve.
When more condensate enters the trap, the bucket loses buoyancy and pulls on valve lever.
When weight of bucket times leverage overcomes pressure on valve, bucket sinks and opens trap.
Key: condensate
steam
steam bubbles
air bubbles

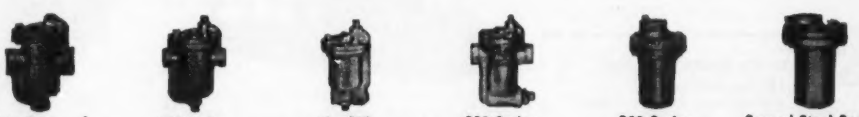
ARMSTRONG INVERTED BUCKET STEAM TRAPS

are designed and made to give you these big benefits:

Amstrong Traps, the first inverted bucket steam traps, now represent the most advanced development of this time-proven principle. They provide all the advantages necessary for efficient, economical condensate drainage from virtually all types of steam using equipment.

1. *No steam loss* – Steam never reaches the orifice even when there is no condensate load.
2. *Automatic air elimination* – Vent in trap bucket passes air and other non-condensibles through to be discharged with condensate.
3. *No cooling leg required* – Condensate is discharged at steam temperature as fast as it reaches the trap because trap operates on difference in density between steam and water not on temperature.
4. *Operates on any back pressure* – Failure of one trap in system will not cause others to open because high back pressure does not affect an Armstrong trap other than to reduce capacity. As long as there is a pressure differential across the orifice the trap will close on steam and open for condensate.
5. *Unaffected by ordinary dirt* – Swirling action of condensate keeps dirt in suspension until discharged with condensate, prevents it from lodging in valve.
6. *Completely dependable* – Proved design plus the use of all stainless steel working parts assure continuity of service and length of service unmatched by any other trap.
7. *Big capacity in a small, economical package* – Armstrong design gives you the highest practical capacity for any given pressure. And remember, Armstrong capacity ratings are based on *hot* condensate at the *working pressure differential* stated, not on theoretical orifice capacities.

Further information on these advantages plus much additional information is given in the 48 page Armstrong Steam Trap Book. Ask your local Armstrong Representative or write direct.


860 Series for low pressure heating service.
800 Series, side inlet, side outlet.
No. 801, side inlet, bottom outlet.
880 Series, integral strainer.
200 Series, bottom inlet, top outlet.
Forged Steel Series for high pressures, high temperatures.

The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.

ARMSTRONG MACHINE WORKS
8802 Maple Street Three Rivers, Michigan
"SEE OUR CATALOG IN CHEMICAL ENGINEERING CATALOG"

Check 1308 opposite last page.

If you use stainless steel plate

this new booklet on Carlson services in stainless steel gives you worthwhile facts!

THIS new Carlson Booklet, "Producing Stainless Steels . . . Exclusively," documents a unique, specialized service. Fully illustrated, it includes detailed sections on stainless steel plates, heads, forgings, special shapes, and other stainless products manufactured by Carlson.

MAIL THIS COUPON . . .
for your personal copy of the new Carlson Booklet.

G. O. CARLSON, INC.
152 Marshallton Road
THORNDALE, PENNSYLVANIA

I would like a copy of the new Carlson Booklet.

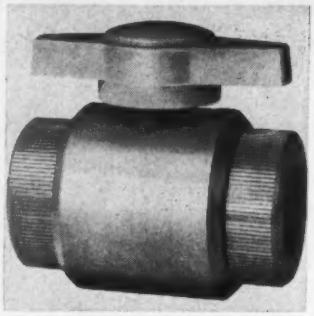
Name_____

Company Name_____

Street Address_____

City_____ State_____

Check 1309 opposite last page.



Solid PVC ball valves are available in sizes of ½ to 2" in screw-end and socket-end (solvent-weld) connections for standard plastic or metal pipe

liquids, and semi-solids at temperatures to 150°F, depending on pressure. Max pressure is 175 psig. Seats are prestressed to preclude chipping.

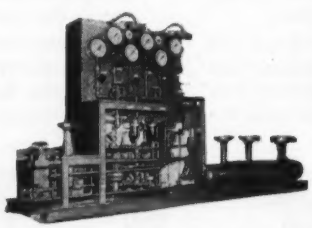
(McCannaflo PVC ball valves are product of Hills-McCanna Company, 4600 W. Touhy Ave., Chicago, Ill.)

Check 1310 opposite last page.

Valve-testing bottlenecks are greatly eased by test stand

Inventory can be minimized by resetting with tester

Available at roughly 1/3 the cost of built-in-plant test stands, a model now being offered will test all valves — including globe, gate, plug-



Valve test stand requires no special operator skill or training

cock, safety and relief types, in addition to other hydraulic, pneumatic equipment.

Outside valve maintenance and related shipping costs are precluded by use of test stand. Valve inventory can be kept at minimum by using test stand to reset valves for vari-

Jacketed Pumps
for handling viscous materials

Pumps for H & B Jacketed Systems are made especially for us to fit the flanges of H & B jacketed fittings. These pumps are engineered to provide maximum efficiency in handling viscous materials. H & B fittings are designed with a double wall forming an all-over jacket, completely insulating the interior line, with no dead spots or unprotected places.

Send for new Bulletin J-57.

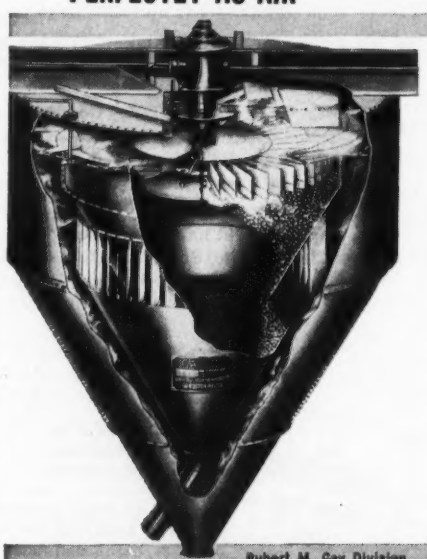
H & B jacketed pump with relief valve by-pass and strainer.

HETHERINGTON & BERNER INC.
A Wholly Owned Subsidiary of American Hoist & Derrick Company
701 KENTUCKY AVE. INDIANAPOLIS 7, INDIANA

H&B ESTABLISHED 1867

Check 1311 opposite last page.

USING SCREEN SEPARATIONS? NOTHING CLASSIFIES AS PERFECTLY AS AIR

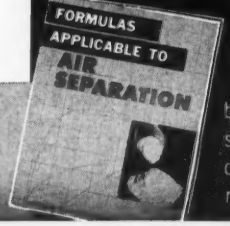


GAYCO
CENTRIFUGAL AIR SEPARATORS

Classify practically all dry fine materials

You get:
- CLOSER SEPARATIONS
- IMPROVED PRODUCTION
- NO UNDESIRABLE OVERSIZE.

RANGE 60 to 400 mesh. Timken bearings. Choice of Standard or Heavy-Duty Models.



this helpful booklet sent on request

Rubert M. Gay Division
UNIVERSAL ROAD MACHINERY CO.
117 Liberty St., New York 6, N. Y.
Factory and Laboratory: Kingston, N. Y.
In Canada: Watson-Jack Hopkins Ltd., Montreal

Check 1312 opposite last page.

ety of applications and pressure variations. Safety is also enhanced through quick testing of safety valves.

Test stand reportedly requires no special skill or training. All controls are within reach of one man with instructions printed on metal plate. It measures 10½ x 3'. Testing for pressure settings up to 2000 psi for air and 6000 psi for water is possible. Built-in air compressor provides useful source for general plant service.

(Universal test stand is detailed in Bul FE-1760 — Farris Engineering Corporation, 505 Commercial Ave., Palisades Park, N.J.)

Check 1313 opposite last page.

Cell-lining thicknesses are reduced 75% by refractory

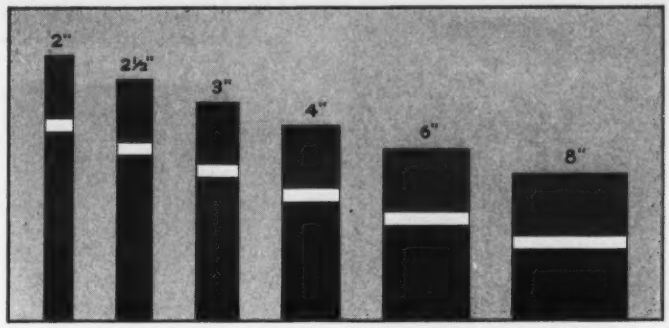
A silicon-nitride-bonded refractory has been developed for linings of aluminum-reduction cells. It is also suitable for use in other applications such as melting and alloying high-purity expensive metals, transferring molten materials, structural ceramic for package boilers, incinerators, and in-kiln furniture for the ceramic industry.

Experimental test results indicate that wall thickness of aluminum-cell linings can be reduced roughly 75% through use of the material. In addition, substantially less electric power is required to operate cells lined with it.

Surface of refractory is unglased with various shades of gray . . . ranging from almost white to very dark. Its fired density is 2.60 g/cc. Modulus of rupture at 1450°C (measured on 9 x 2¼ x ¾" test bars) is 3800 psi. Resistance to corrosion by molten Cryolite and aluminum at 1000°C (measured on 4½ x 2½ x 2½" quarter brick sections over six two-hour cycles of exposure) was average volume loss of 1.1%.

(Crystolon 63 refractory is product of Norton Company, Worcester 6, Mass.)

Check 1314 opposite last page.

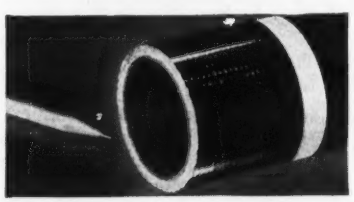


Choose from 6 sizes. Same operating temperature range . . . same operating pressure range . . . same corrosion resistance . . . NEW 6- and 8-inch sizes meet the growing demands of the processing industries.

Now! A complete size range of Fibercast Epoxy Pipe—including new 6″ and 8″

- *handles a temperature range from 65° to 300° F.*
- *withstands an operating pressure range up to 1200 psi.*
- *pipe sizes from 2″ to 8″*

Only Fibercast, with its unique reinforced epoxy resin construction, can withstand sustained high pressures, high temperatures and extreme corrosive conditions more efficiently than any other pipe. Fibercast's ability to competently handle 320 of 338 corrosive solutions is on record. And now Fibercast, in answer to more of the needs of industry, brings its proven value to larger size flow lines.

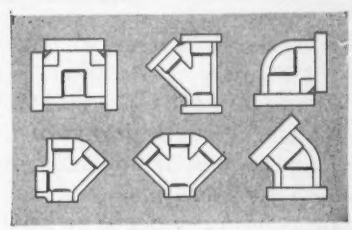


Fibercast Tube and Pipe, ranging in size from 2″ to 8″, is not subject to cold flow or permanent set. It is exceptionally easy to install, readily following ditch contours, saving many costly manhours where other non-metallic pipes or coated metal pipes simply do not work effectively.

The operating collapse strength of Fibercast is another major factor in its wide-spread use. It has a proven capability of maintaining a collapse load of *twice* the rated collapse!* Moreover, Fibercast is much lighter than steel (less than ¼ its weight) and is correspondingly easier to handle, during both installation and maintenance.

**An additional safety factor is that Fibercast, with its seamless woven glass fiber construction, cannot burst.*

Fibercast Fittings, of course, are also available for the new sizes. They represent the world's most complete stock of standard sizes and types. And, as always, you can have couplings, or even complete piping systems, designed and made to order for your individual requirements.



Get the full story on Fibercast's cost-saving advantages to industry. Learn how it can help *you* solve *your* pipe and tube problems. Mail the coupon today.

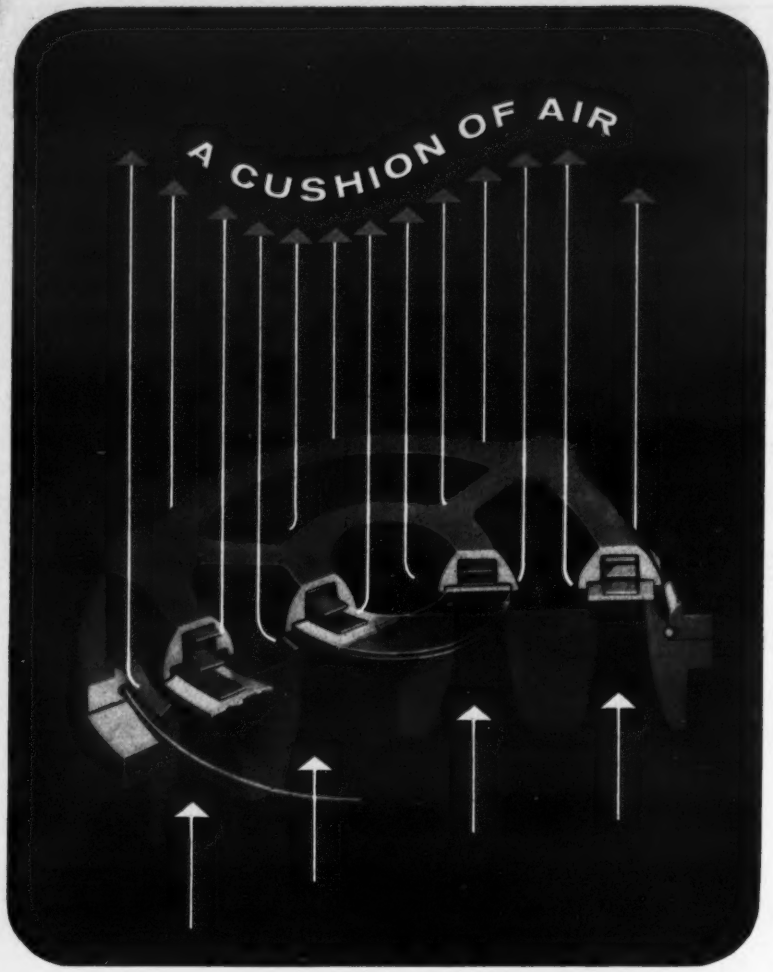
FIBERCAST® COMPANY

A DIVISION OF THE Youngstown SHEET AND TUBE COMPANY

FIBERCAST COMPANY
Box 727, Sand Springs, Okla.
Please send me further information about Fibercast Tube and Pipe. CP-11A

Name _____
Title _____
Firm _____
Type of Business _____
Address _____
City _____ Zone _____ State _____

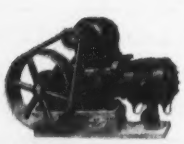
Check 1315 opposite last page.



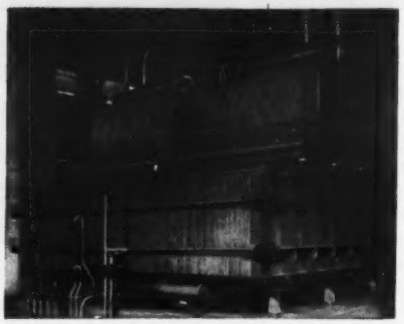
makes PENNSYLVANIA COMPRESSORS run efficiently...silently...with minimum maintenance. Stainless steel valve discs lift against a cushion of air in the simple, efficient design of the Air Cushion Valve that makes PENNSYLVANIA Compressors run so silently, so dependably, and with such low maintenance requirements. Air Cushion Valves have no nuts, bolts, or screws to break or burn fast. You get longer valve life . . . eliminate wear . . . eliminate noise caused by metal striking metal. Flat valve discs have no flexing or bending action to weaken or distort them; they remain perfectly flat and tightly seated over long periods of service.

But this is only part of the PENNSYLVANIA story. Learn all the facts in "Compressors For Industry." It describes PENNSYLVANIA Compressors from 10 to 350 hp, horizontal, angle, and OILFRE models. Write to Dept. B-11 for your copy today.

PENNSYLVANIA
PUMP AND COMPRESSOR COMPANY
Easton, Pa. • Earning Customer Confidence Since 1920



Check 1316 opposite last page.



One of sixty electrolyzer units in one of the world's largest water-electrolysis plants, at Hindustan Chemicals & Fertilizers, Ltd. in Nangal, India. Two canned sealless pumps (left foreground) circulate a 25-30% KOH electrolyte solution to 108 bipolar De Nora cells in the 24'-long x 18'-high electrolyzer

Maintenance-downtime bottleneck bypassed by canned pumps

Chalking up a near-perfect record in handling electrolyte, 120 sealless pumps have been instrumental in maintaining virtually continuous 24-hr/day operation of a large water-electrolysis plant in India

An uninterrupted water-electrolysis operation spells $$$ in the production of fertilizer and heavy water at the Nangal, India, plant* of Hindustan Chemicals & Fertilizers, Ltd. Under full-scale conditions the plant (one of the world's largest water-electrolysis installations) produces 900,000 cfph of hydrogen. This hydrogen is used for ammonia synthesis in fertilizer production. Also, deuterium is separated out in the production of 15 tons/yr of heavy water.

Maintaining ideal 24-hr/day continuous operation of the water-electrolysis plant hinges directly upon an uninterrupted supply of electrolyte to the plant's sixty 24'-high x 18'-high, 10,000-amp electrolyzers. At each electrolyzer, two pumps circulate a 25-30% KOH electrolyte solution to 108 bipolar De Nora cells clamped together in a filter-press configuration.

* Plant was designed and supplied by Oronzio De Nora-Impianti Elettrochimici of Milan, Italy.

Pump Maintenance Was Woe

The centrifugal pumps used in this application until recently, while they needed only normal maintenance attention for their design, were felt to require an excessive amount of downtime. In their place were substituted 120 canned sealless pumps. The move has proved a wise one.

Except for occasional bearing checks, pumps have necessitated no dollar-squandering maintenance downtime — a considerable improvement over the former situation. This extremely low maintenance requirement can be attributed to the pumps' simplicity of design. Each consists of eight basic components — rotor-impeller assembly, stator assembly, two bearings, two bearing housings, pump chamber and circulation tube.

This type of pump is a combined motor and pump, having neither seals nor stuffing boxes. Rotor assembly revolves within the pumped

fluid. A small portion of pumped fluid circulates through motor section to cool motor and lubricate bearings. Both rotor and stator are canned within Type-316 stainless-steel non-magnetic liners. Capacity of each unit is 90-100 gpm at head of three ft.

Double-suction of the pumps provides relatively low NPSH characteristics. Inlet velocities are low enough to permit handling of fluids with some dissolved gas. Pumps are oversized, with low hydraulic loading compared to full-load capacities. However, Hindustan feels that this low over-all efficiency is more than compensated for by the resulting greatly extended operating life of pumps.

(CDS Chempumps are product of Chempump Division, Fostoria Corporation, Huntingdon Valley, Pa.)

Check 1317 opposite last page.

Temperature and color change in unison

Uses: Temperature indication on various surfaces.

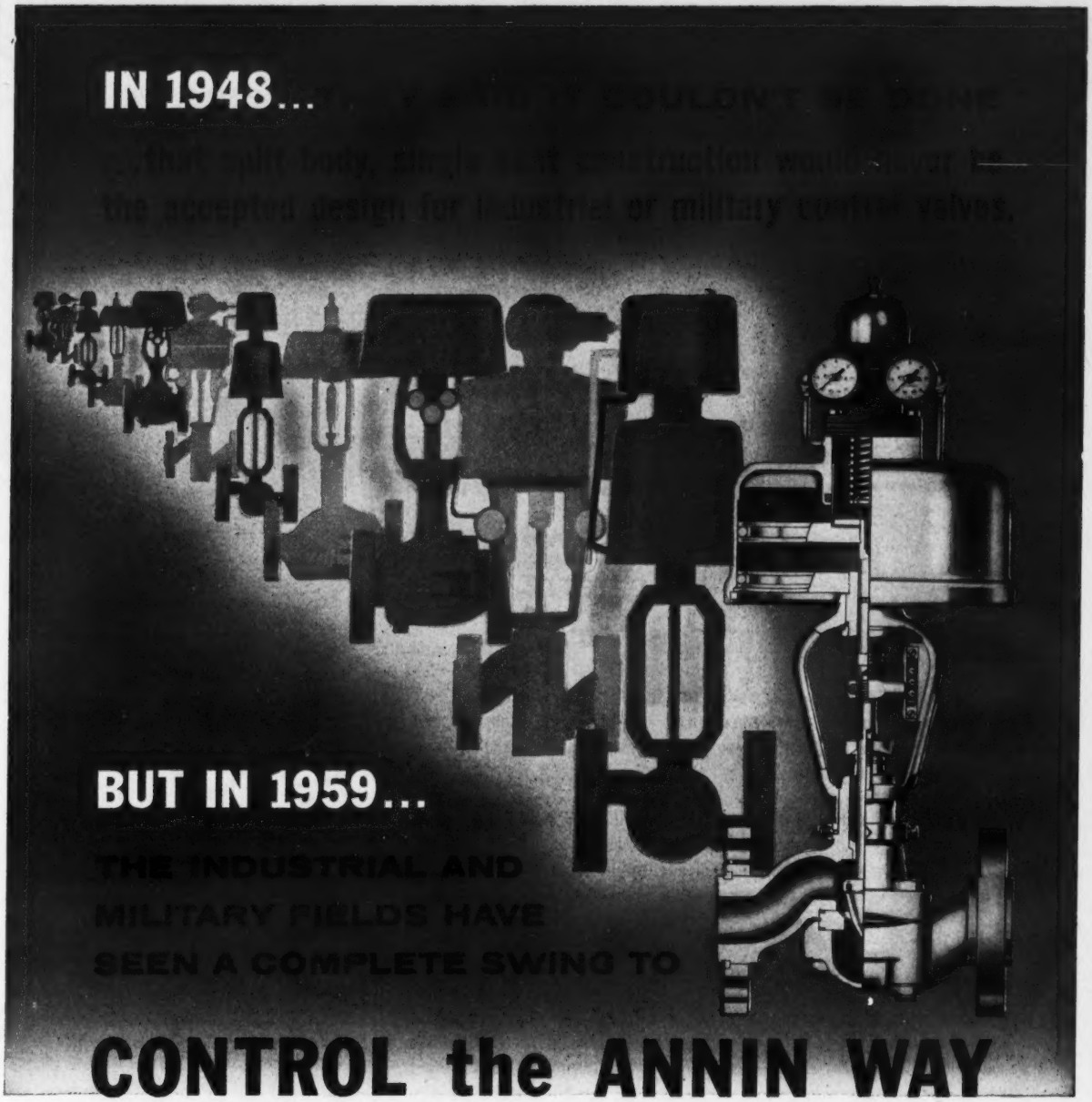
Features: Temperatures of any hot surface are indicated by distinct changes in color.

Description: Temperature-indicating materials are available in two forms—crayons and paints. Eighteen crayons provide temperature measurements in 150 to 1240°F range. Thirty-six paints cover 104 to 2462°F span. Thirteen of these paints undergo multiple color changes at different temperature levels.

Crayons and paints can be used on all hot surfaces, including those exposed to reducing atmosphere, atmospheric moisture, traces of hydrogen sulfide and carbon-dioxide concentrations to 50%. Sulfur dioxide and ammonia affect only a few paints and no crayons.

(Thermocron crayons and DetectoTemp paints are product of Air Reduction Sales Company, Division of Air Reduction Company, Inc., 150 E. 42nd St., New York 17, N. Y.)

Check 1318 opposite last page.



In 1948 split body construction and powerful high speed, precise positioning pneumatic piston actuators were available from only one source—Annin. Today, more than a decade of accumulated experience in this type of valve design makes Annin features and performance records the best in the valve industry. Contrary to published statements by critics ten years ago, Annin-type construction is now available from many sources. But when tempted to consider *mere-replicas* of Annin valves, remember this—they might give you a few Annin features, but when you specify Annin Valves you get them all!

Annin VALVES

THE ANNIN COMPANY
1040 South Vail Avenue
Montebello, California

Check 1319 opposite last page.

EASTERN PORTABLE MIXERS

especially designed for small batch processes

offer . . . precise mixing results with long term cost savings

Eastern Portable Mixers are especially designed for dependable, low cost service in small batch processes. Where fixed mounted installations are not required, Eastern's Portables offer greater versatility, ease of handling, and long term cost savings.

Speeds of 420, 1125, and 1725 R.P.M. rated from 1/20 to 3 H.P. are standard, with variable speed and air-driven models also available. Motors in all standard types can be supplied in semi-enclosed, totally-enclosed, or explosion-proof construction. Shafts and single or dual propellers are available in a choice of alloys for all service requirements. New optional ball-swivel clamp as illustrated, permits easy adjustment of mixer position in tank.

For a personalized analysis of your mixing problems, send details to Eastern engineers. A recommended solution will be furnished promptly and without obligation. For a helpful guide to mixing fundamentals, write for "Handbook of Fluid Mixing."

NEW PORTABLE MIXER BULLETIN

Eastern's improved line is included in the revised Portable Bulletin No. 530-A.

Eastern
INDUSTRIES, INC.
MIXER DIVISION
Regent Street
East Norwalk, Conn.

Check 1320 opposite last page.

Stubborn drum contents eased out by heaters

Viscous materials in drums are easily heated with a recently developed flexible electric heater. It is designed to fit any steel drum in diam range of 21-½ to 23-½".

Heaters can be wrapped around drum and attached with spring mechanism. They are made of vulcanized silicone rubber, fiber-glass, cloth and metal-screen laminate. Bands are 2-½" wide.

Flexible drum heater is attached by means of spring mechanism

(Drum heaters are product of Electro-Flex Heat Inc., 83 Woodbine St., Hartford 6, Connecticut.)

Check 1321 opposite last page.

Concrete joints turn back toughest temp attacks of summer, winter

Two rubber-asphalt joint-sealing compounds are now available for joints and cracks in concrete. Materials will not flow or extrude in summer nor crack and pull away from joint walls in winter.

The two forms: hot-poured and cold-applied types. Hot-poured variety is thermoplastic, rubberized-asphalt compound designed specifically for horizontal joints to pre-

for difficult fluid flow problems use

PF

Flexible Tubing MADE FROM TEFLON*

When PF flexible tubing made from Teflon is used on the most difficult fluid flow applications, it turns in an amazing performance: extremely long life because it is unaffected by any commercial solvent; application to unusual jobs because it retains its flexibility and toughness even at temperatures as low as -450°F. and higher than 500°F.; easily cleaned and sterilized because of its smooth, chemical resistant surface. In addition, this tubing has very low permeability and its translucency shows fluid flow.

Some of the many places where unique PF flexible tubing made from Teflon is used include:

- acid, solvent and catalyst lines
- sampling tubes
- thermocouple wells
- laboratory tubing
- tubing for waste handling
- fuel lines
- hydraulic lines
- medical tubing
- tubing for creameries
- tubing for food manufacture
- inert lines for pharmaceuticals
- deionized water

Write, wire or call us with your difficult fluid flow problems. We can solve them with flexible tubing made from Teflon tailored to meet your size, color and application requirements. Our normal procedure includes inspection and proof pressure testing every inch of the material so that you are sure of a uniform, highest quality product. Flare, insert and ferrule type fittings can be used with this PF tubing.

PENNSYLVANIA FLUOROCARBON CO., INC.

1115 N. 38th Street, Phila. 4, Pa.
EVergreen 6-0603
TWX: PH 252

*DuPont registered trademark

Check 1322 opposite last page.

vent infiltration of extraneous materials into joint spaces.

Cold-applied joint sealer is ready-mixed rubberized-asphalt compound. It is particularly applicable for sealing of narrow joints.

(Hot-poured and cold-applied Horn-Tite are products of A. C. Horn Companies, Division of Sun Chemical Corporation, 2133 85th St., North Bergen, New Jersey.)

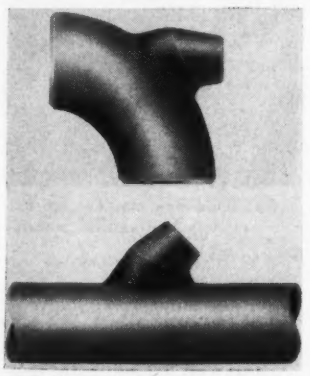
Check 1323 opposite last page.

New angle in fittings gives improved climate for fluid flow

Inside-outside angle combo permits full-penetration weld

Uses: Attaching branch outlets at ends in pipe system.

Features: Fittings provide good fluid-flow conditions. Combination of angles on both



Angle fittings provide good flow conditions

inside and outside of fittings enable full penetration weld, even in most acute angle section between fitting and run pipe.

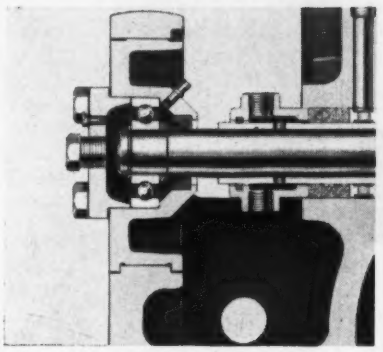
Description: Angle-fittings design incorporates varying thicknesses from its acute section between fitting and run pipe to obtuse section. This provides metal placement in manner to reinforce at point of max stress.

(Elbolet fittings are product of Bonney Forge Division, Bonney Forge and Tool Works, Allentown, Pa.)

Check 1324 opposite last page.

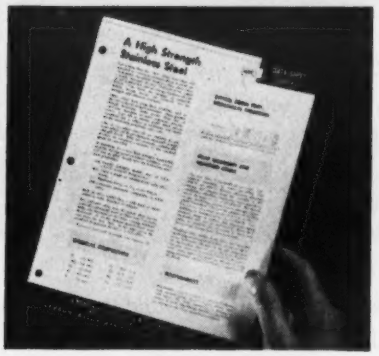
PUMPAGE

Goulds news about pumps for process industries



When life hangs by 5/1000 of an inch

Whether life is long or short depends on the proper fit of shaft to bearing. Destroy the fit by 5 to 10 thousandths of an inch—and you shorten bearing life. Therefore Goulds pump shafts are ground and polished to within the tolerances specified by bearing manufacturers. To insure complete accuracy, bearing housings are bored by a special machine. Careful handling when removing and replacing bearings in the field will also go a long way toward protecting fit and helping bearings live to a ripe old age.



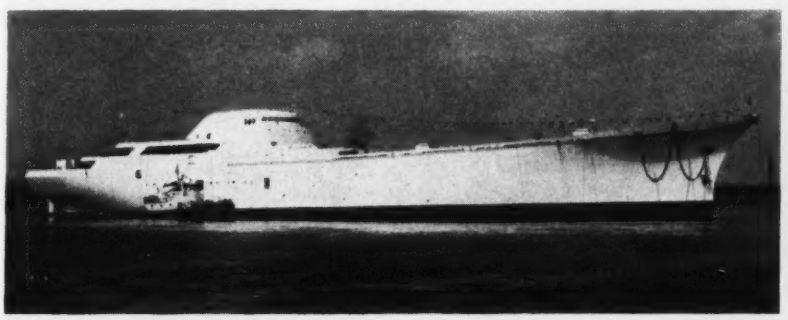
Now... ISO-40 to guard against corrosion and abrasion

A stainless of great strength, ISO-40* alloy survives under some very harsh conditions. Strongly oxidizing nitric solutions don't faze it. It's a match for 50% sulfuric at r.t. It resists corrosion, abrasion, high shock. Can be furnished with a B.H.N. hardness of 320, tensile strength of 145,000 psi. A pump with an ISO-40 impeller circulated a slurry of sodium sulfite and sodium carbonate for 17 months with negligible impeller damage. Speaking of pumps, did you know you can get Goulds chemical pumps in ISO-40?

*Registered trademark of Empire Steel Castings, Inc.

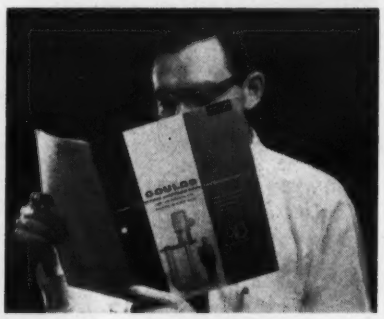
Circulating crude phthalic anhydride

One company does it with two Goulds Model 3171's. Each delivers forty gallons a minute of this sluggish solid (sp. gr. 1.2) from a depth of 11 ft. at temperatures from 300 to 525 F. How? The discharge pipe, which extends from pump through pit cover, wears a steam jacket. Temperature stays up—phthalic anhydride stays fluid. The long pipe has a 3″ expansion joint. Additional steam-jacketed pumps of other and varying lengths give flexibility to the installation. For details on how Goulds Model 3171's can help *you* move uncooperative solids, write for Bulletin 726.2.



Nuclear nomad of the seven seas

N. S. Savannah, first atomic-powered merchantman, will call at the seaports of the world as a symbol of the peaceful use of nuclear power. The 21,800-ton ship has a practically foolproof power plant. Its pressurized-water nuclear reactor uses uranium oxide fuel. Goulds Model 3655 (close-coupled centrifugal) pumps the radioactive waste water on both bilge and ballast service. The Model 3655 is available in 23 sizes with capacities to 2000 gpm, heads to 400 ft. Pump and motor are a single, compact unit, easy to install and ready to run. Standardization of parts holds down inventories. For full details, including specifications, construction information and performance charts, write for Bulletin 710.1.



NEW "king-size" vertical... capacities to 3180 gpm

Here are all the details on Goulds newest heavy-duty centrifugal sump and process pump—the "L" size Model 3171. Unit available in 316 stainless and other special alloys. Specifications, sectional views, construction materials, performance curves, dimensions—all are clearly given in Bulletin 726.2. For your copy, write Goulds Pumps, Inc., Dept. CP-110, Seneca Falls, N. Y.

GOULDS PUMPS

Check 1325 opposite last page.

jamesbury
"Double-Seal"™
BALL VALVES

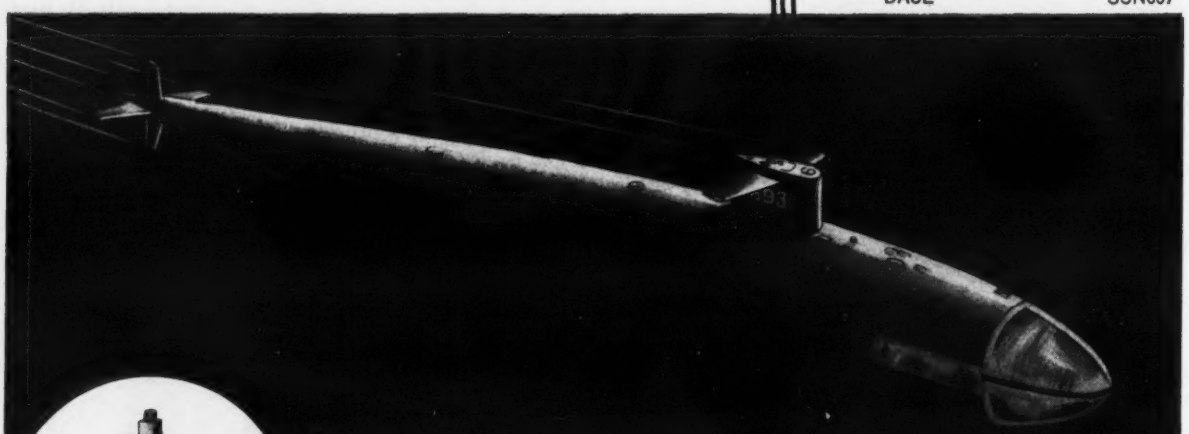
HELPING TO BUILD THE NUCLEAR NAVY

19 Nuclear Submarines in operation or under construction will carry Jamesbury "Double-Seal" Ball Valves.

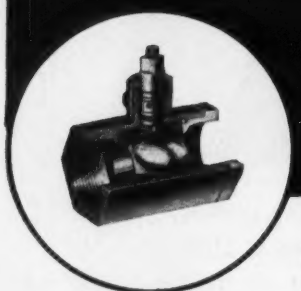
The Jamesbury "Double-Seal" Ball Valve principle solved vital operational problems for our nuclear navy and is today a major factor in the building of our atomic undersea power.

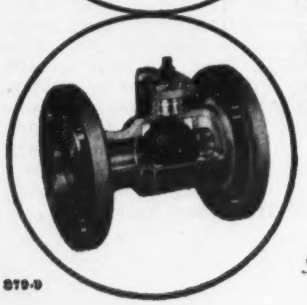
Submarines Served by Jamesbury Include:

GROWLER	SSG577
BARBEL	SS580
BLUEBACK	SS581
BONEFISH	SS582
NUCLEAR SUBS	
SWORDFISH	SSN579
SEADRAGON	SSN584
HALIBUT	SSGN587
SCAMP	SSN588
SCULPIN	SSN590
SHARK	SSN591
SNOOK	SSN592
POLARIS CLASS	
THEODORE ROOSEVELT	SSBN600
ROBERT E. LEE	SSBN601
ABE LINCOLN	SSBN602
THRESHER CLASS	
THRESHER	SSN593
PERMIT	SSN594
PLUNGER	SSN595
POLLACK	SSN596
BARB	SSN603
HADDO	SSN604
JACK	SSN605
TINOSA	SSN606
DACE	SSN607



Our Nuclear Navy Specifies Jamesbury Ball Valves For:





Jamesbury High Pressure "Double-Seal" Ball Valves At Work In Air & Hydraulic System.

Unique Jamesbury "Double-Seal" Ball Valves serve throughout Industry. Write today for the Jamesbury brochure "At Your Service".

- compactness of design and size
- dependable, instant 90° on-off
- high impact strength
- easy maintenance
- low operational noise level
- corrosion resistance

• If any or all of these features is important in your valving requirements, then you too can depend on Jamesbury Ball Valves.

JAMESBURY CORP., 64 New Street, Worcester, Mass.

Distributors in Principal Cities

879-9

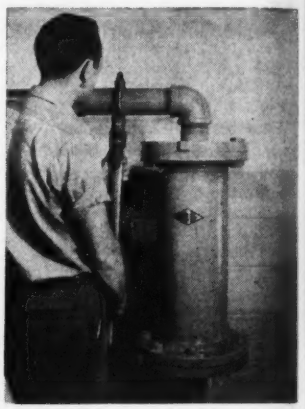
Check 1326 opposite last page.

Pressure blowback foiled by valving design of classifier

Uses: Classifying gas-liquid flow in vertical in-line installations.

Features: Classifier prevents inadvertent pressure blowback of air or gas through process fluid. This eliminates liquid eruption and splashing associated with such blowback.

Description: Gas-liquid flow classifier permits passage of liquids while preventing passage of gases. Classifier valving remains open for full-flow with negligible pressure drop as long as there is fluid in



Gas-liquid flow classifier can be installed in any vertical process line

line. At same time, valve is automatically closed and held closed under pressure seal as soon as line is emptied of fluid. This avoids pressure blowback.

Flow classifiers are available in three sizes: for two-, three- and four-inch pipe diameters. They must be installed in vertical lines.

(Flow classifier PMABB is product of Prenco Manufacturing Company, 2605 W. Fourteen Mile Rd., Royal Oak, Michigan.)

Check 1327 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

CP cartoons are spotlighted on Stepan Chemical's bulletin board

Pictured here is bulletin board at Stepan Chemical Company in Chicago. It recently featured cartoons from CHEMICAL PROCESSING as part of featured theme for that month — "Safety & Maintenance Make Jobs Secure." Cartoons (which can be seen scattered among larger photos and slogans) were used in effort to "soft sell" points of safety, maintenance, corrosion control.

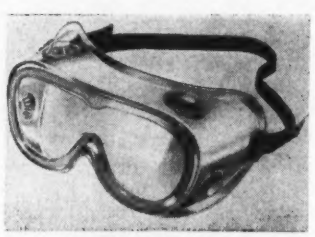
Detect temp safely

. . . in hazardous atmospheres with temperature detector qualified for use in Class 1, Group C & D; Class II Group E, F & G; and Class III locations. Tip-sensitive resistance detector is hermetically sealed and can be obtained in lengths to 10'.

Detector is designed particularly for measurement of bearings of machinery. It can be provided with spring-loaded holders or mounted in thermowells (for measuring liquid temperatures.)

(Temperature detector 334-7 is detailed in Publication 1045-11—Instrument Division, Thomas A. Edison Industries, McGraw-Edison Company, West Orange, N.J.)

Check 1328 opposite last page.



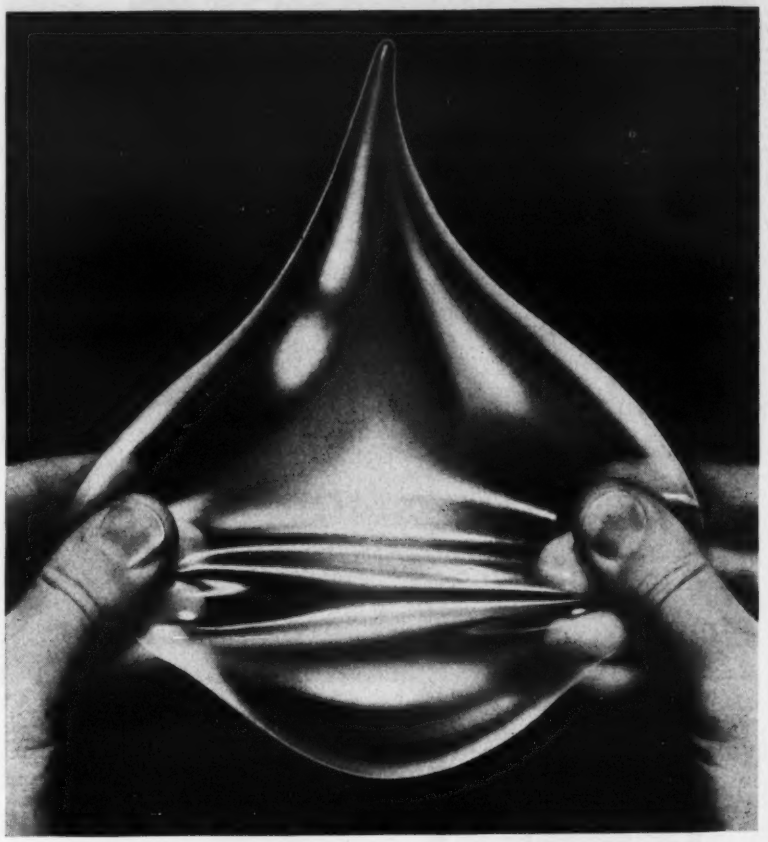
Dust is duped

. . . by flexible-frame safety goggle incorporating flexible-frame cushion which fits to plastic vents (open-louvered front and rear for dust conditions, and open-louvered rear only for splash conditions). Goggles are available in clear or green frames with clear or green single lens.

(Fexible-frame safety goggle is product of Welsh Manufacturing Company, 28 Magnolia Street, Providence, Rhode Island.

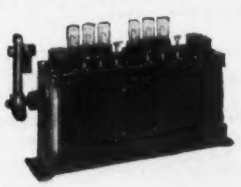
Check 1329 opposite last page.

How to STRETCH



a drop of oil...

Manzel force-feed lubricators squeeze the full potential out of every drop of oil you purchase. Model "94", for example, pumps against pressures up to 3,000 pounds, handling any grade of oil from the lightest mineral oil to the heaviest cylinder stock with the same regularity. Model "94" starts, stops, speeds up and slows down in synchronization with your machinery. Every change in engine speed brings a corresponding change in the amount of oil delivered. For details on our whole line of *responsive, responsible* lubricators, write for our catalog. Manzel, 251 Babcock Street, Buffalo 10, New York. For the most efficient lubrication,



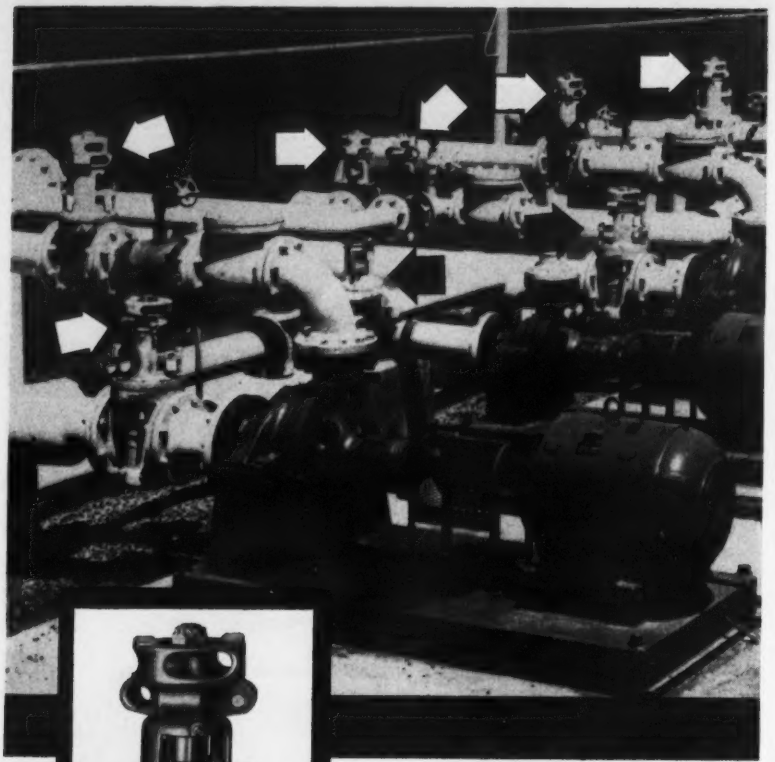
ask the man from

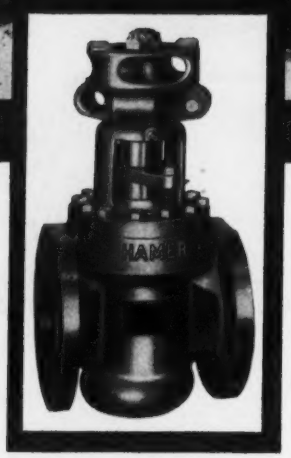
UNIT OF HOUDAILLE INDUSTRIES, INC.

Manzel

SPECIALISTS IN LUBRICATORS AND METERING PUMPS SINCE 1898

Check 1330 opposite last page.





Eliminate the expense and trouble of valve lubrication with

HAMER PLUG VALVES

Hamer Plug Valves are unsurpassed for sure sealing, ease of operation and low maintenance cost. Being non-lubricated they not only eliminate the cost of lubrication but also prevent contamination of line product. The powerful plug adjusting nut acting as a screwjack is a positive means of raising and lowering the plug when operating the valve.

The plug and body seats are finished on special grinding machines and individually matched for precision fit, assuring smooth operation and perfect sealing.

Hamer Plug Valves are available in sizes 2" through 12" in working pressures to 600 lbs. W.O.G. Ask your Hamer Valve Specialist for complete specifications and applications of Hamer Plug Valves. Write for new catalog.

WECO® WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS
Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION
HV-3-60

WECO UNIONS

CHIKSAN SWIVEL JOINTS

HAMER LINE BLIND VALVES

HAMER PLUG VALVES

Check 1331 opposite last page.

Al fittings are slated for steam-traced-pipe duty

Cast-aluminum fittings are now in production for installation of extruded aluminum

Tee is turned 180° to show steam-trace section exposed and end preparation, 37-½° beveled product area and one-inch cutback on steam section (to permit welding product line)

integral steam-traced pipe. Fittings in seven nominal sizes of one to eight inches are available in 90 to 45° short-radius bends, tees, crosses, 45° laterals, and eccentric reducers.

(Traceline® fittings are product of Alcast Fittings, Box 151, Claymont, Del.)

Check 1332 opposite last page.

"Hey Joe! Better change that filter for the next batch! This one is passing too much solid matter!"

Idea by Paul W. Isenberg, Radio Corporation of America

NOW

competitively priced!

NEW

Aeromaster INDUSTRIAL COOLING

FAN

featuring "QUICK-SWITCH" BLADES

Blades can be installed after hub is mounted on drive shaft

Performance, construction, and price make this the "best buy" in industrial fans! Delivers more CFM with *less* H.P. Features a ductile iron hub, removable blade retention caps, heat treated aluminum alloy blades with constant chord width and flanged ends. 4, 6 and 8 bladed fans available in 54" to 120" diameters. Maximum tip speed is 15,000 ft./min. Easy to install . . . easy to maintain. For complete details, write: KOPPERS COMPANY, INC., 5211 Scott Street, Baltimore 3, Md.

KOPPERS® Aeromaster Fans

Engineered Products Sold with *Service*

Check 1333 opposite last page.

THAT'S INTERESTING

Space ace's squirt fete

Dinner will be served in a plastic squeeze bottle to space aces of the future, Joseph L. Greenwall, president of American Cellular Corp., predicts.

Lack of gravity will make pouring impossible, he points out, so food will have to be squeezed from container into pilot's mouth.

Protects flowers

Need for packing materials is eliminated by chemical compound developed to reduce dehydration losses of plants in dormant storage.

Designated Rutex, sprayable compound forms sponge-like film on stems and roots which swell in contact with water. Product was developed by UBS Chemical Company.

For more information on product at right, specify 1334 see information request blank opposite last page.

CARBORUNDUM'S TECHNICAL INFORMATION ON ELECTRIC HEATING

Data sheet

HEATING WITH SILICON CARBIDE ELEMENTS

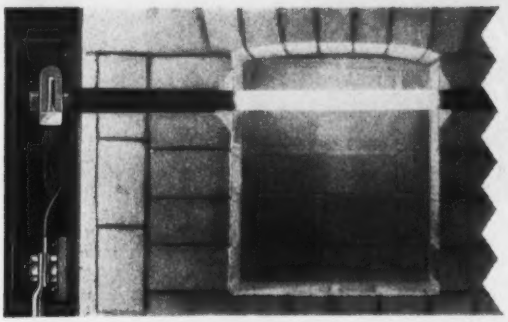
With electric heat, temperatures can be precisely maintained, cycles can be exactly duplicated, and furnace temperature can be accurately controlled. Product quality is improved, rejects sharply reduced. Electric furnaces and kilns are compact, clean, quiet and thoroughly dependable. There's also no fire or explosion hazard.

For these reasons, investigation of an electric heating application should include more than a comparison of Btu or electricity costs. The advantages and savings of electric heat frequently more than offset fuel cost differential. And this is particularly true in the case of furnaces heated with SiC elements.

Heating with GLOBAR® silicon carbide elements offers designers, builders, and operators of process equipment distinct advantages:

- Rod type elements simplify furnace design and construction.
- Long and trouble-free service. Maintenance is reduced and servicing simplified.
- Exceptionally high efficiency, low heat loss, clean radiant heat. No exhaust gases or combustion fumes. Cooler and safer working conditions.
- Elements easily and quickly installed from outside the furnace, there's no need to cool or unload the chamber. Production and operating losses are minimized.
- Temperatures up to 2800° F. Accurate heating independent of atmosphere.
- Elements can be operated continuously or intermittently in oxidizing or protective atmospheres within certain limitations.
- Transformers unnecessary for some applications. With these "on-the-line" installations, even lower initial cost.
- Elements available from stock or within 2 weeks if manufacture is necessary. Sizes range from ¼"-2⅛" in diameter, and from 4"-105" in length. Resistance tolerance only ±10%. Elements matched to meet your requirements.

Carborundum's accumulated experience and data may help solve your process heating problems. We invite your inquiries or contact electric furnace builders.



An element is a round rod with a heating section and a low resistance terminal at each end. The heating section is silicon carbide recrystallized for strength and rigidity at high temperatures, and contains no bonding material. The extremities of the terminals are metallized with aluminum to provide low resistance contact with the flexible straps. Elements can be mounted horizontally or vertically.

Ease of replacement is important feature of GLOBAR® elements. Operators simply shove in new ones without cooling down the kiln or furnace.

Typical applications of GLOBAR® silicon carbide heating elements

Annealing, sintering, brazing and heat treating of metals
Firing ceramics
Calcining powders and magnetic materials
Silver soldering and the firing of silver on ceramic parts
Roasting fluorescent oxides
Forging high strength, precision pieces
Firing of porcelain enamel
Reduction of oxides
Sublimating molybdic oxide
Production of Magnesium
Melting and annealing glass

Write today for your free copy of our technical Bulletin H describing physical and electrical characteristics of GLOBAR *elements. The address: Dept. CP-110, Globar Plant, Refractories Division, Niagara Falls, New York.*

For latest advances in silicon carbide heating elements . . . count on **CARBORUNDUM®**

If your pumping requirements involve pressures from 100 to 12,000 psi, temperatures up to 500°F, you'll find John Bean's pump literature extremely helpful. Get these data-packed bulletins for handy finger-tip reference . . . or avail yourself of John Bean trained and experienced engineers for immediate action.

FREE

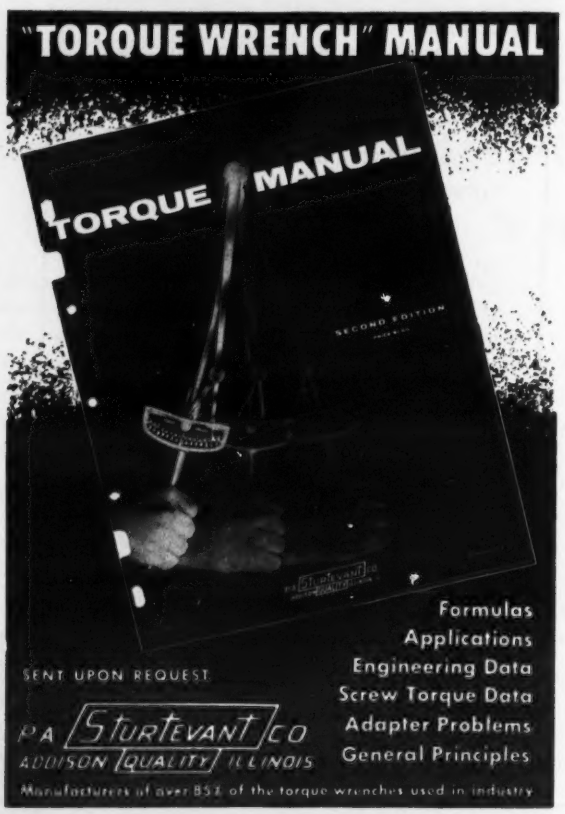
L-66-38	Triplex Pumps, inside packed
L-1484	New Triplex Pumps, outside packed
L-1168	Triplex Power End for Industrial reciprocating pumps
L-25-70	Vertical Duplex Pumps
L-1169	John Bean Pump Accessories
L-1106	Aquablast High Pressure Washers

ALSO CUSTOM DESIGNED PUMPS

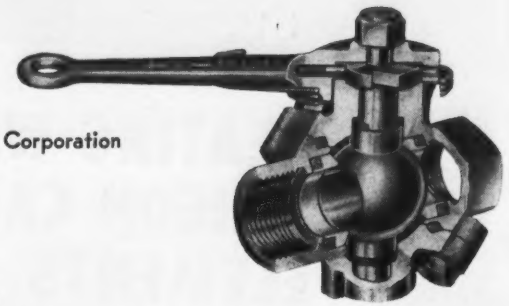
SEND INFORMATION REQUEST FORM TODAY
(Please list catalog number wanted)

John BEAN
DIVISION OF
FOOD MACHINERY & CHEMICAL CORP.
INDUSTRIAL SALES DEPARTMENT
LANSING, MICHIGAN • SAN JOSE, CALIFORNIA
fmc

Check 1335 opposite last page.

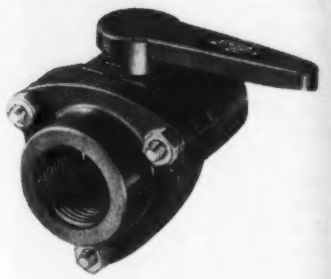


Check 1336 opposite last page.



Besler Corporation

Cameron Iron Works



Hoke Incorporated

Ball valves keep rolling as design variety grows

Four more manufacturers jump into thick of fray to woo the CPI ball valve dollar

If the chemical industry is not being a shrinking violet about its infatuation with the ball valve, then neither are the valve manufacturers behaving exactly as bashful suitors. As predicted in these pages in August,* new blood is quickly flowing into this fast-growing field.

The competitive din went up a few more decibels recently with introduction to the CPI of four more ball valve lines. The only sure winners in this race are the chemical-processing men who have an ever-wider (and, inevitably, ever-more-economical) variety from which to choose.

Hoke Incorporated has come up with a tough UPVC line of ball valves. They have a tensile strength of 8500 psi. The valves can be heat-welded or solvent-bonded right in the line. Their temperature limit is 140°F, and they are good for service to 125 psi.

The Teflon-seated valves can be cleaned . . . and their seats and packings replaced . . . without removal from line. Coupling-like assembly on every valve permits each half to be fitted to pipe ends and then reassembled. The line is initially being offered in ½, ¾ and 1" sizes — all with NPT female connections. Larger sizes will soon be available.

Besler Corporation's Valve Division has entered the CPI ball valve market with a line in the size range of ⅜ to 2". Sizes of 3, 4, 6 and 8" will be added at the first of the year. Operating pressures of these valves extend to 1000 psi.

Materials for stock Besler ball valves are bronze and aluminum. Stainless-steel and ductile-iron versions may be obtained by special order. Seats are of nylon, Kel-F and synthetic rubbers; seals of synthetic rubbers. Balls are hard-chrome-plated in bronze and iron models, hard-anodized in the aluminum versions. Ratchet option is offered at a higher price (one pull opens valve, one pull closes).

Cameron Iron Works has built its ball valve line around the principle of rotating seats — an idea picked up from their gate valve. With this feature, each operation of the valve partially rotates the seat. This changes relation of mating surfaces and gains a continuous reseating.

These valves are now being made in sizes of 2 to 36" (for 150- through 600-psi ASA classes) and 2 through 6" (for

* " 'Cinderella' ball valves strike it rich in CPI," p 34.

Hot Tip On

FLUID LINE PROBLEMS

AEROQUIP *Flexible Hose of Teflon and Reusable "super gem" Fittings**

Even under high pressure, constant flexing and temperatures from —65° to 450°F., users report long life for Aeroquip Hose of Teflon and "*super gem*" Reusable Fittings—chemically inert, excellent lubricity, ideal for chemicals, hot air, solvents and steam. Get bulletin IEB-50—or see "Yellow Pages" under "Hose" for your Aeroquip Distributor.

*U.S. Patent Nos. 2,833,587 and 2,731,279
"*super gem*" is an Aeroquip Trademark
Teflon is DuPont's trade name for its tetrafluoroethylene resin

STANDARDIZE ON Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN
INDUSTRIAL DIV., VAN WERT, OHIO • WESTERN DIV., BURBANK, CAL.
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

Check 1337 opposite last page.

BETTER PERFORMANCE

• *Less slippage*
• *Longer life*

Try Darcova Pumcups in your reciprocating pumps and cylinders, and you too will realize what a *big* difference they make.

Because they are "engineered" for their job—in precisely controlled textures, shapes and types—and are noted for outlasting other packings at least 3 to 1! Why not get the advantage of this tremendous saving in maintenance and down-time?

Pumcup designs include the conventional and 45° bevel types in a full range of sizes for all reciprocating pump and cylinder requirements.

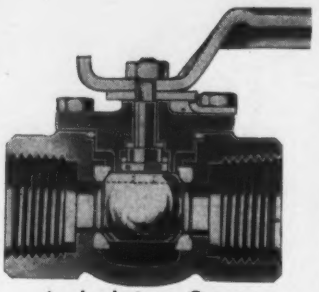
Get all the facts

Send today for helpful Bulletin No. 5903.

DARLING VALVE & MANUFACTURING CO.
Williamsport 4, Pa.

DARCOVA TRADE MARK PUMCUPS

Check 1338 opposite last page.



Lunkenheimer Company

API 1000- to 5000-psi working-pressure ratings).

Lunkenheimer Company's ball valve features top entry through a removable cover. Once cover is opened, the ball can be easily removed by means of a tool on the valve's specially designed handle. The self-aligning ball rides on seats of Teflon or Buna-N. O-ring seals are made of either of same materials.

The valves are initially being introduced with bronze bodies and screwed ends in sizes of ¼ to 2". A stainless-steel line is being readied and a carbon-steel option will follow.

In addition to new lines in the CPI ball valve field, those concerns already manufacturing ball valves are constantly improving and expanding the types available in their lines. Case in point: Hills McCanna whose latest effort along these lines is described on p. 163 of this issue.

Want to Know More?

More detailed information on the ball valve lines mentioned in this article may be obtained from the following companies:

Valve Division, Besler Corporation, 4053 Harlan St., Emoryville, Oakland 8, Calif.

Check 1339 opposite last page.

Cameron Iron Works, Box 1212, Houston 1, Tex.

Check 1340 opposite last page.

Hoke Incorporated, 1 Tenakill Park, Cresskill, N.J.

Check 1341 opposite last page.

Lunkenheimer Company, Beekman & Waverly Avenues, Cincinnati 14, Ohio.

Check 1342 opposite last page.

Keeps your men dry and comfortable ... come hail or high water!

Light, flexible North PVC wet-weather clothing

For head-to-toe protection against wind, rain and sleet, outfit your men in North PVC foul-weather gear by Jomac. It's rugged as all get-out: coated on both sides, with all points of strain reinforced and all seams completely sealed by electronic welding. Yet it's light and flexible ... and the jackets have set-in sleeve design and generous cut that allow full freedom of motion. It's safer: comes in a bright "safety" yellow for maximum visibility. And it lasts: will not crack, flake or peel, in use or in storage ... extremely resistant to abrasion and snagging ... wonderfully easy to wash. Write for literature!

Welded Seams

Seams are stitched with synthetic thread, then shielded and electronically welded for maximum strength and protection. In addition, buttons are electronically welded in place.

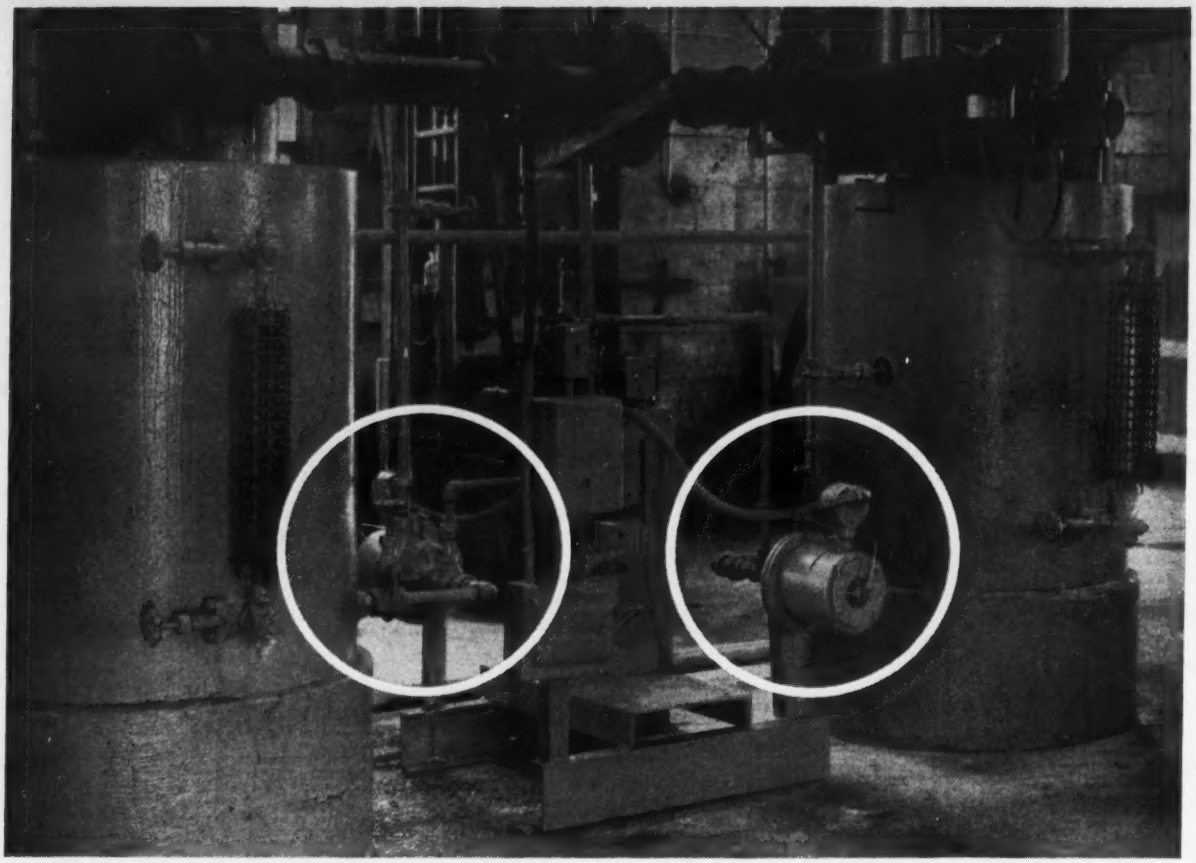
Also ask about our complete line of North PVC coated gloves and chemical-resistant clothing

JOMAC

JOMAC Inc., Dept. N
Philadelphia 38, Pennsylvania

"Jomac Sells Quality ... and Quality Sells Jomac!"

Check 1343 opposite last page.



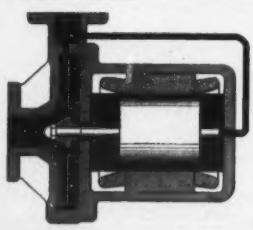
Chempump eliminates frequent shutdowns

handling hot caustic at Delmar Chemical Company

These two *Chempumps* are on the job 24 hours a day, 7 days a week at Delmar Chemical Company, Elkton, Md. They circulate caustic through scrubbing towers for gas purification, and have completely eliminated excessive shutdowns caused by conventional pump stuffing box and seal problems.

These dependable, leakproof pumps are out of operation only for a simple annual replacement of bearings, their only wearing parts. *Chempumps* have no seals, no stuffing box, no packing. No external lubrication is needed, since bearings are constantly lubricated by the pumped fluid itself. Caustic can't leak out and air cannot enter the pump.

Chempump offers many exclusive advantages in any chemical handling application. It would be well worth your while to check them. For details concerning a specific application, write to Chempump Division, Fostoria Corporation, Buck and County Line Rds., Huntingdon Valley, Pa. Engineering representatives in over 30 principal cities in the U.S. and Canada.



Chempump combines pump and motor in a single, leakproof unit. No shaft sealing device required.

U.L. approved. Available in a wide choice of materials and head-capacity ranges for handling fluids at temperatures to 1000 F. and pressures to 5000 psi.

CHEMPUMP®

First in the field...process proved

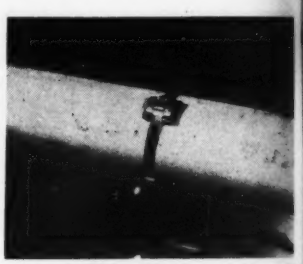
Check 1344 opposite last page.

Pipe patch stays put after quick, simple operation

Pipe-repair can be accomplished quickly by men not specially trained for the job with a recently developed technique. Incorporating a thermosetting epoxy resin, system can be used on any diam pipe operating at pressures to 100 psi. It requires relatively small inventory of materials for work on all pipe sizes.

Average workman can reportedly repair a small hole in a six-inch pipe in 10 to 30 minutes, depending on working conditions and amount of experience. Epoxy used will withstand continuous operating temperatures in excess of 200°F.

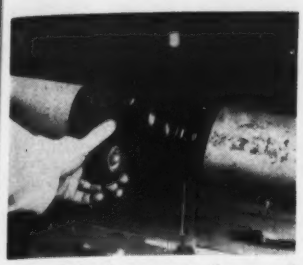
Repair method incorporates pressure hand gun which is used to force epoxy fluid into simple tape mold . . . through specially designed injection fitting. Step-by-step operation is as follows:



1 — Pipe leak is covered with pad of plastic vinyl tape. When resin pressure patch is being applied to pipe still in service, steel strap may be used to hold tape wad in place against internal pressure.

2 — Layers of spacer screen are wrapped over plug to serve as porous framework or mold body for resin. Next,

injection fitting is put in place and electrical tape applied as container for resin.



3 — Final wrap is layer of cloth restricting tape which prevents mold from expanding when resin is applied under pressure.

4 — Resin is forced into tape mold with hand gun at approximately 100 psi. It hardens in 30 minutes and is completely cured in less than two hours.

(Further information on epoxy resin pipe-patch technique may be obtained from Minnesota Mining and Manufacturing Company, 900 Bush Ave., St. Paul 6, Minn.)

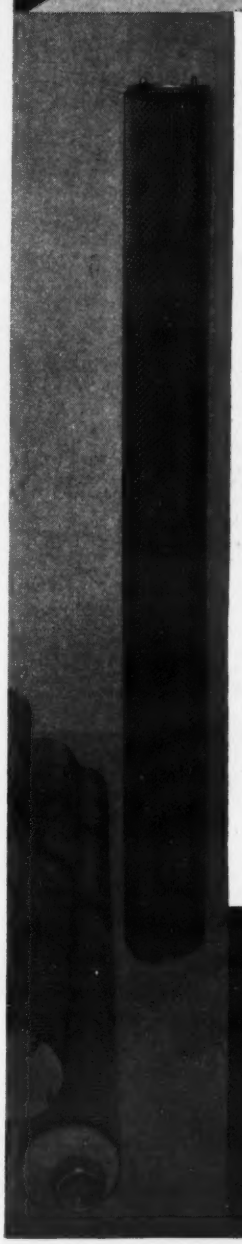
Check 1345 opposite last page.

Two-component plastics mixed and dispensed without waste

Uses: Metering, mixing and dispensing two component-plastic systems, such as epoxies.

Features: Dispenser gives uniform volume, hardening and strength of two-component systems to eliminate waste.

Description: Self-contained dispenser 1) pumps controlled



Who cares about your Wire Cloth Fabrications?

CAMBRIDGE does . . .

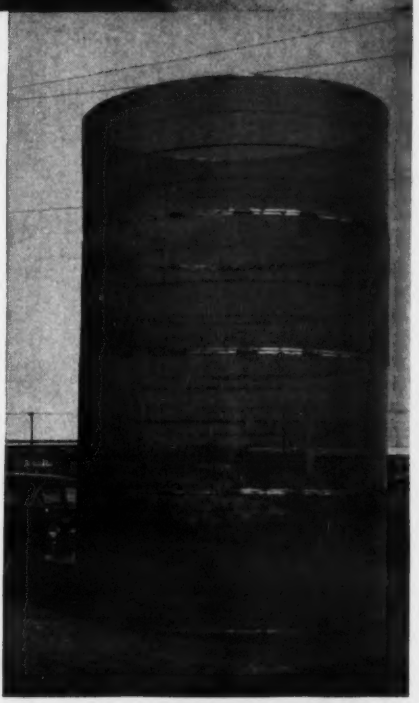
that's why you automatically get service with your order . . . whether you need dozens of midget strainers or a single giant-sized retaining screen.

Careful, competent workmanship and constant inspection assure you of quality . . . modern machinery and accurate scheduling assure you of prompt delivery. And, a Cambridge Field Engineer follows up your order to make sure our product is giving you the best possible service. Let us quote on your next order for wire cloth fabrications. We manufacture wire cloth from any metal or alloy—including titanium—in nine basic weaves. We'll work from your prints or draw up prints for your approval. Call your Cambridge Field Engineer . . . he's listed in the yellow pages under "Wire Cloth". Or, write for FREE 94-PAGE CATALOG.

The Cambridge Wire Cloth Co.

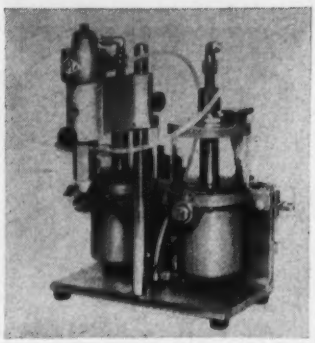
Department F • Cambridge 11, Md.

Manufacturers of Wire Cloth, Metal-Mesh Conveyor Belts, Wire Cloth Fabrications



Check 1346 opposite last page.

amount of each component from its reservoirs to mixing chamber, 2) cycles itself through controlled motor-driven shear-and-agitation mixing operation, and 3) dispenses measure mixed charge with positive drip-proof cut-off.



Dispenser automatically meters, cycles and dispenses two-component-plastic systems, such as epoxies

Machine can be adjusted to wide range of cycles and materials. It can be adapted to any automatic or semi-automatic production line.

(Nuplabond machine 100 is product of New Plastic Corp., 1026 N. Sycamore Ave., Los Angeles 38, Calif.)

Check 1347 opposite last page.

Air-operated equipment lubricated independently of air flow

Uses: Lubrication of compressed-air-operated equipment.

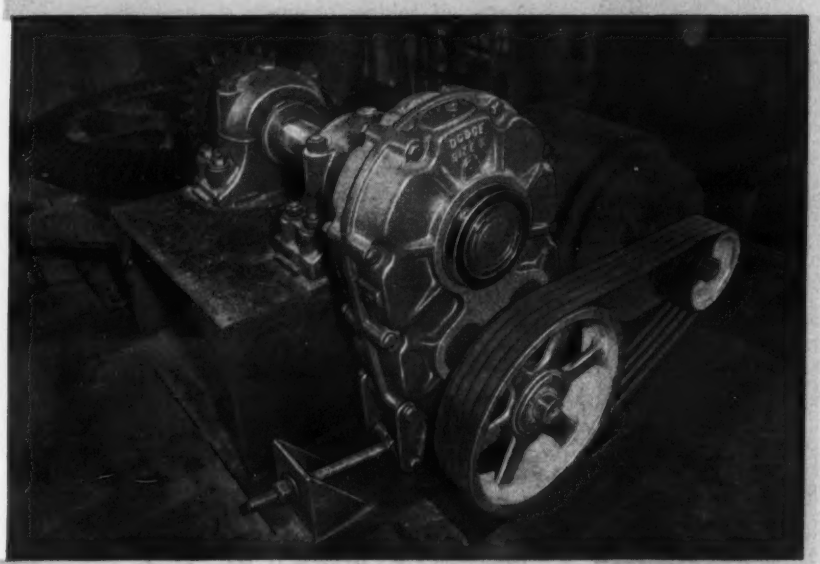
Features: Unit provides positive lubrication of air-operated equipment, even when such equipment is located in high, overhead places and when air flow through lubricator is quite low and/or infrequent.

Description: Air-operated-equipment lubricator system operates on pressure variations and is entirely independent of air-flow rates and duration of flow periods.

Outlet end of oil-delivery line may be placed in any location. Therefore, oil delivery to exact spot desired is assured without need for auxil-

DODGE TORQUE-ARM SHAFT MOUNTED SPEED REDUCER

Install it anywhere—with minimum time and effort. Here is an overhead installation on tanning drums. Torque-Arm reducers are resistant to acid fumes, salt water environment, moisture.



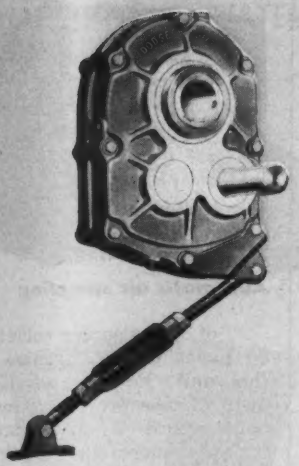
DODGE TORQUE-ARM SHAFT MOUNTED SPEED REDUCER

Can be positioned any place on the entire length of the shaft. It locks into place on *both* sides of the housing. Note modified torque arm on this installation on a mixer in a beverage plant.

The Speed Reducer Idea that

Two things account for the record popularity of Dodge Torque-Arm Speed Reducers. First, they cost less to install since they require no foundations, sliding motor rails or flexible couplings. Second—and most important—these modern reducers as developed by Dodge perform *brilliantly*. Tens of thousands of installations underscore Torque-Arm dependability. Torque-Arm is America's *quality* shaft mounted speed reducer!

Torque-Arm has been so extensively adopted by industry that today models are available for a vast range of applications. The Torque-Arm line offers you capacities up to 170 hp—output speeds from 10 to 400 rpm—in single and double reduction series—with 5 to 1, 15 to 1 and 25 to 1 ratios. Models for vertical or inclined shaft operation are available—as well as special-application versions such as flange mounted, right

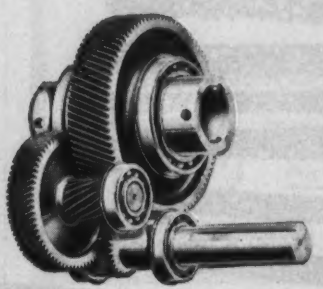


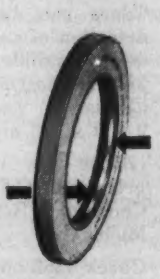
Rugged semisteel housing—
a solid backbone for solid service

Here is a tough, corrosion-resistant housing with the strength to hold bearing seats in line for the life of the unit. Perfect shaft and gear alignment are assured by doweling the matched halves together and boring in line. No gear is overhung. Loads are carried easily, contributing to Torque-Arm's long life and high efficiency—97% in double reduction models, almost 99% in single!

AGMA rated gears—
quality-guarded by continual tests

These helical gears have soft cores to withstand shock—and hardened surfaces to resist wear. Their quality is guarded in manufacture and assembly by the most modern methods of quality control, including inspection for runout, tooth spacing, helical lead and involute profile. They run quietly, mesh precisely. Teeth are crown shaved for maximum contact area. Gears are shrunk on their shafts to prevent shifting.





Modern double-lip seals
keep oil in and dirt out

Modern synthetic, double-lip seals of the highest quality keep oil in and dirt out of the reducer case. These seals offer protection for the unit from dust and dirt and just as effectively insure cleanliness when operating in laundries, textile mills, food processing plants.

Re-ally Clicked!

angle and extended input shaft styles. Optional equipment includes a positive, sealed-in backstop and a positive overload release.

Ask your local Dodge Distributor. Or write us for our 64-page Torque-Arm Speed Reducer Bulletin, complete with engineering data and easy selection tables.

DODGE MANUFACTURING CORPORATION
6200 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."

Check 1348 opposite last page.

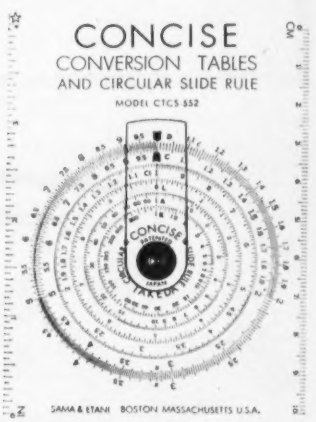
iary pressurized oil supply. Unit delivers metered amount of oil and controls amount of oil feed from "very rich" and "very lean."

(Crown Pulse Lubricator is product of Hannifin Company, Division of Parker-Hannifin Corporation, Des Plaines, Ill.)

Check 1349 opposite last page.

Pocket circular slide rule has a slide-out insert of conversion tables

A clever combination of a pocket slide rule and conversion tables meets the basic quick-reference and calculation needs of engineers. Face of PVC unit incorporates circular slide rule having outer circumference of 7-½". C, CI and D scales have as many



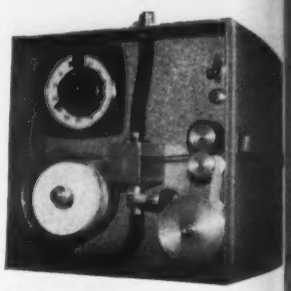
Both data and circular slide rule are incorporated in this pocket-sized PVC unit

subdivisions as a 10" straight slide rule. Also included are A, K and L scales.

A table of elements and temperature-conversion charts are on back of pocket unit. Sliding insert includes many conversion factors, constants and other data. The device can be obtained with company advertising message imprinted. The shirt-pocket-sized slide rule comes with case and instruction booklet

(Concise slide rule may be obtained from Sama & Etani, 26 Medfield St., Boston 15, Massachusetts.)

Check 1350 opposite last page.



Automatic air sampling

. . . of test samples collected on paper tape is function of this unit. Periodic advancement of tape provides permanent record of air pollution for subsequent analysis. Once in operation, sampler regularly operates unattended for days or weeks on one tape. Part of tape can be removed for on-the-spot study without interrupting sampling program.

In addition to handling dust and aerosols, instrument makes gas and radioactive-particle sampling possible. Provisions for internal evaluating attachments have been incorporated. Toxic gases are detected by using special sensitized tapes. Tapes can be prepared for detection of such gases as hydrogen sulfide, hydrogen cyanide, phosgene and similar agents. Air sampler measures 9 x 9 x 10″ and weighs 20 lb.

(Paper-tape air sampler is product of Gelman Instrument Company, Box 86, Chelsea, Michigan.)

Check 1352 opposite last page.

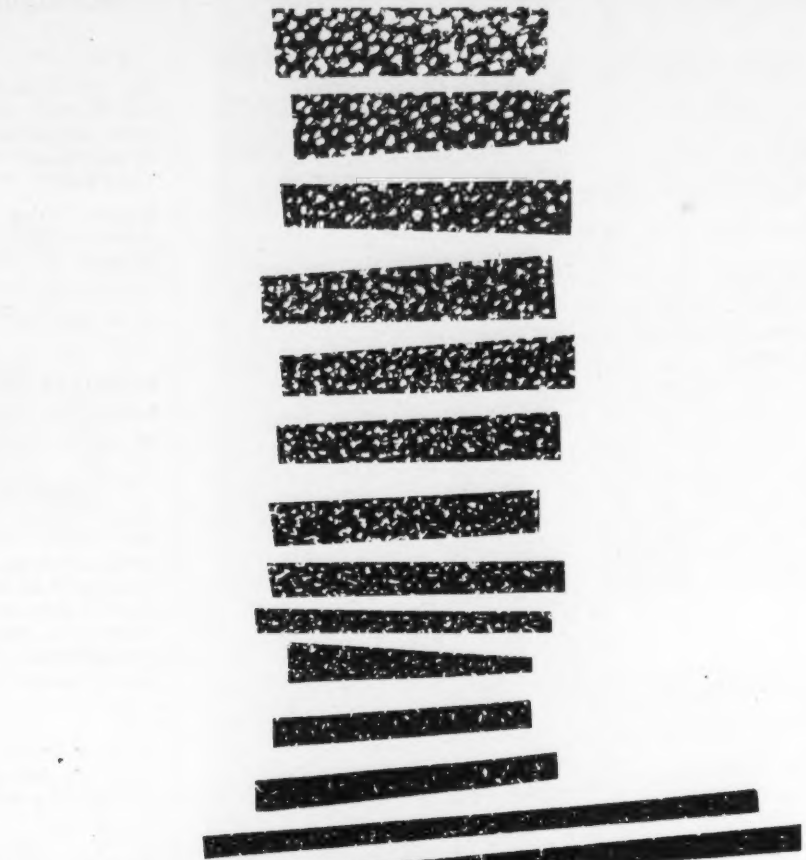
Heat it, dispense it— in single operation

Uses: Heating and dispensing of asphalt, pitch, waxes, thermoplastics, adhesives and similar compounds.

Features: Heat is evenly distributed at low watt density, by blanket-type element covering entire tank bottom and 75% of sidewalls.

Description: Tanks and pots have temperature ranges of 250 to 500°F and 150 to 550°F, respectively. Special thermostats are available for low-temperature compounds in 100 to 300°F range.

Hand-, foot- or solenoid-



exploring the Sub-Micronosphere

The Sub-Micronosphere is the mystifying and challenging province of the small dust and fume particle, the "Submicron," which never exceeds 1/25,000" in size. Submicrons are elusive, wily and extremely difficult to capture . . . unless you use the right technique. Conquerors of the Sub-Micronosphere have found the Ducon Oriclone Scrubber to be a most effective weapon. It has captured Submicrons by the millions. The Oriclone is a new type of high energy scrubber . . . smaller . . . more economical . . . yet more effective than other units. It is the ideal collector for fine dusts and fumes.

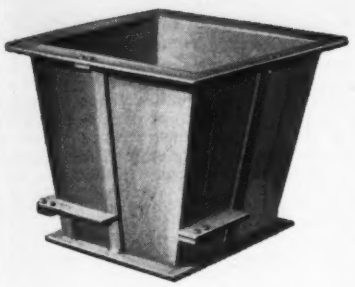
Ask for Bulletin W-8560 and learn more about the Oriclone.

the name in Dust Control

THE Ducon COMPANY, INC.
147 EAST SECOND STREET • MINEOLA, L. I., NEW YORK
CYCLONES • CENTRIFUGAL WASH COLLECTORS • TUBULAR CLOTH FILTERS • DUST VALVES
Canadian Branch:
THE DUCON COMPANY, of CANADA, Ltd., 1131 Portia St., BURLINGTON, ONTARIO, CANADA

Check 1351 opposite last page.

For accurate reproduction of bulk material formulations—W-C BATCH-WEIGHING SYSTEMS



In any batching operation—from simple dump-and-fill weighing to multi-ingredient ratioing — W-C Batch-Weighing Systems provide the reliably accurate net-weight control essential to consistent product uniformity.

Chief reason for this is the W-C Pneumatic Weight Transmitter. A rugged yet sensitive force-balance unit, it is capable of an accuracy of ±0.25% calibrated weight range, with reproducibility better than 1 part in 2000.

Each W-C Batch-Weighing System is designed to job specifications, using pre-engineered, unitized components of *known* performance capabilities. Consequently, you are spared the uncertainties—and costs—of "prototype" engineering . . . yet you realize the very tangible benefits of an application-engineered system built to your requirements.

Typical applications include: Formulating solid rocket fuels, refractories, varnishes, plastics, food products, dry or liquid.

Write for new Bulletin 14

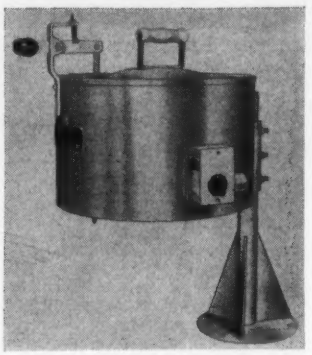
W & C WEIGHING & CONTROLS, INC.
Div. of CompuDyne Corp.

E. County Line Road • Hatboro 10, Pa.

Check 1353 opposite last page.

operated heated needle valves of standard orifice provide for dispensing. Standard sizes are ⅛, ¼, ⅜ and ½".

Pots may be obtained in standard single-phase voltages of 115 to 230v, 50 or 60



Heat in dispensing tanks is evenly distributed at low-watt density by blanket-type element covering entire tank bottom, and 75% of sidewalls

cy. Tanks are available in single- or three-phase voltages of 115, 230, 460 or 550v, 50 or 60 cy.

(Tanks and pots are product of Sta-Warm Electric Company, Chestnut St., Ravenna, Ohio.)

Check 1354 opposite last page.

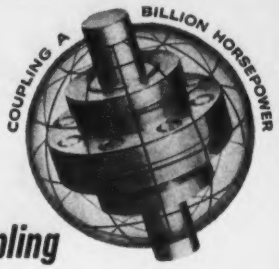
NEW LITERATURE
Plant Engineering, Safety and Fluids Handling

Standard pipe identification is explained in a pipe-marker kit which gives step-by-step instructions on setting up a complete uniform marking system. It tells which pipes must be marked for max safety and protection, where marking should be located to speed tracing and prevent errors, and how they should be marked to conform with ASA Standard A-13, "Identification of Piping Systems." Pipe Marker Kit—W.H. Brady Co.

Check 1355 opposite last page.

Silencers are subject of 12-page catalog illustrating typical sound-control applications with graphs showing reduction of noise in decibels. "Sound Control"—Allied Witan Company, Inc.

Check 1356 opposite last page.



More equipment manufacturers choose Fast's Couplings than any other gear-type coupling

Leaving other claims aside, the thing that counts in couplings is customer confidence—and industrial equipment manufacturers have made Fast's their overwhelming choice. The Fast's line is more diversified, too—in a complete range of sizes and types for shafts, from ½" to 32" and larger.

Every Fast's Coupling brings you superb engineering only the original gear-type coupling can deliver. Smooth-running units that are designed to outlast the machines they connect. Rapid service from experienced field engineers backed by outstanding stock facilities. Write today for full details on couplings to suit your needs to: KOPPERS COMPANY, INC., Fast's Coupling Dept., 1711 Scott St., Baltimore 3, Maryland.

KOPPERS **FAST'S COUPLINGS**
Engineered Products Sold with Service

Check 1357 opposite last page.

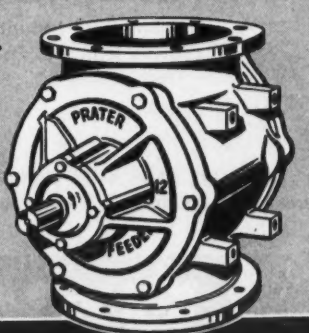
PRATER ROTARY AIRLOCK FEEDERS

for

DUST CONTROL and PNEUMATIC CONVEYING

Write for "How to Select A Rotary Airlock Feeder" Bulletin P58

the recognized LEADER



FOREMOST BUILDERS OF ROTARY AIRLOCKS

PRATER PULVERIZER COMPANY
1513 South 55th Court — Chicago 50, Illinois

Check 1358 opposite last page.

New B&W REFRACTORIES FOR THE CHEMICAL INDUSTRY

B&W's line of refractories has been enlarged by the addition of new heavy duty firebrick and new ramming mixes. These new products, now offered after many years of developmental and field experience, are specifically designed for superior service in gas generators, industrial carbon baking furnaces, silicate of soda tanks and sulphur burners and other typical furnaces commonly used in chemical processing.

FIREBRICK

★

KAO-HB

HIGH BURNED SUPER DUTY FIREBRICK

Fusion point 3220 F. This brick offers an excellent balance of properties to assure superior service. It provides approximately 5% more alumina content and lower total impurities than competitive brick. It has excellent spalling resistance.

KAO 60

60% ALUMINA FIREBRICK

Fusion point 3250 F. Provides higher hot load strength than any competitive brick. Spalling loss is only 1%.

KAO 70

70% ALUMINA FIREBRICK

Very low total impurities provide long life. Spall loss of only 2%.

RAMMING MIXES

★

MULRAM E

USE LIMIT 3200F
ALUMINA CONTENT–80%

This new ramming mix with extremely low permeability provides exceptional resistance to slag or molten metal penetration. High strength provides good erosion resistance.

MULRAM EF

USE LIMIT 3100F
ALUMINA CONTENT–90%

Similar to Mulram E but supplied in finer grain.

FOR COMPLETE PROPERTIES SHEETS and additional information on these new B&W Refractories products, write to The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, N. Y.

B&W THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

R-8578

B&W Firebrick, Insulating Firebrick, and Refractory Castables, Plastics, Ramming Mixes, Mortars, and Ceramic Fiber.

Check 1359 opposite last page.

ENGINEERING & SAFETY

Combustion-safeguards line, including automatic firechecks and safety blowouts is covered in 12-page bulletin which includes installation diagrams, detailed drawings and pressure-loss charts. Bul CS-2—Selas Corporation of America.

Check 1360 opposite last page.

Fire-extinguishing equipment, for power plants and electrical installations, and use of carbon dioxide, for generator purging and coal-bunker inerting, are outlined in pamphlet C162-3560—Cardox Division, Chemetron Corporation.

Check 1361 opposite last page.

Air-intake units and unit heaters are subject of 12-page bulletin, including construction and control details, complete preformance data and dimensions of items in line. Bul A-117—Hartzell Propeller Fan Company, Division of Castle Hills Corp.

Check 1362 opposite last page.

Plastic parts are tabulated in 16-page bulletin, including photographs and specifications for Teflon, Nylon and Delrin stock parts. Bul AD-177—Garlock Inc.

Check 1363 opposite last page.

Combination strapping tools which tension strap, apply seal, make joints, and cut strap are depicted in Strapping Tools Bul—Signode Steel Strapping Company.

Check 1364 opposite last page.

Demineralizers, of mixed-, two- and four-bed types, are tabulated in 36-page catalog illustrated with charts, specification drawings and installation photos. Cat 160—Barnstead Still and Sterilizer Co.

Check 1365 opposite last page.

Pipe connections and accessories are covered by 44-page manual including all new types and ratings of clamps, collar-type unions, flanges, vessel nozzles, closures and bleeder valves. Products with related applications are also catalogued. Included in publication is 10-page table of allowable working pressures for pipe and connections from 1 to 30" for temperatures to 1500°. Relative costs of 39 pipe materials are also tabulated in 1960 Cat—Grayloc Sales Division, Gray Tool Company.

Check 1366 opposite last page.

Electric-motor data, for design, selection and specification, is tabulated by means of drawings and data charts in 14-page Price Bul 150. This may be obtained by letterhead request from Doerr Electric Corporation, 100 N. Fourth Ave., Cedarburg, Wis.

LAST 3 TIMES LONGER, PUMPING ABRASIVE LIQUIDS

Left to right are shown: R. W. Delaney, General Foreman of Maintenance of the Westinghouse Mansfield plant; C. N. Greene, Tuller Corporation, Columbus, Ohio and W. O. Hale, Paint Lab. Foreman of Westinghouse, inspecting one of two rows of Viking paint pumps.

WESTINGHOUSE Electric Corporation's major appliance plant at Mansfield, Ohio has materially reduced the problem of pumping abrasive type coating materials, according to Mr. C. Reining, Manager, Works Engineering. **VIKING'S** new abrasive liquid **PUMPS** are the answer, working 24 hours a day, 7 days a week. These new pumps are lasting three times longer than any previous equipment and still going strong. Pressures range from 45 to 95 PSI. Of the 28 **VIKING PUMPS** handling paints, primers and finish coatings in the Westinghouse Mansfield plant, 12 are the latest type of **VIKING** abrasive liquid construction. The other 16 will be replaced with new type **VIKINGS.**

Have an abrasive liquid pumping problem at your plant? Profit by this Westinghouse experience! Install new VIKING PUMPS, with ceramic bearings and mechanical seals, especially designed to handle abrasive* liquids and provide long pump life. When writing please give this information: 1. Liquid pumped, 2. Viscosity of liquid (SSU), 3. Percentage and type of solids present in liquid, 4. Temperature of liquid, 5. Specific gravity, 6. Capacity of pump, 7. Suction lift or head, 8. Discharge pressure . . . and ask for bulletin SP-507CC. VIKING PUMP COMPANY, Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" PUMPS. (*Consult factory for recommendations on pumping abrasive liquids other than paints and inks.) See Our Unit in Chemical Engineering Catalog.

Check 1367 opposite last page.

need more information . . .

Note there is a key number at the end of editorial articles or advertisements. To request more information check the proper number on the convenient form opposite the last page. Send the form to us . . . we do the rest. Information comes direct to you. No obligation, of course.

Contract Maintenance

From page 39

and they are supervised by the contractor.

When more men are required for peak periods, they are hired locally through building trades unions. Catalytic has an international contract with 14 of the AFL building trades unions in Washington. Frequent meetings are held to review and resolve problems. Locals in various cities have no direct control over this overall contract. During the several years it has been doing contract maintenance, Catalytic has had only a negligible amount of labor difficulties.

Nine of the companies shown in the table are among those in the chemical processing field for which Catalytic is doing contract maintenance. One of these nine is the Tidewater refinery at Delaware City, worth about $200 million and running about 165,000 bbl of crude per day. Nearly all of maintenance is done under contract.

Fast Work on Shutdown

An example of how a major shutdown was handled at Tidewater shows flexibility of CM: On December 30, 1959, Catalytic was notified that the 102,000-bpd fluid cat cracker was in trouble and would probably have to be shut down. After some discussion, Tidewater's management fixed the feedout time at midnight Saturday, January 2. Catalytic contacted various labor unions and scheduled in manpower for first phase of shutdown.

After initial inspection of cracker on January 5, Tidewater's management decided it would be economical and convenient to also bring down the following additional units on January 13, 14 and 15:

86,000,000-cu-ft/day gas plant,
130,000-bpd crude unit,
5000-bpd alkylation unit,
21,000-bpd polymerization unit,
350-tons/day sulfur plant.

To handle this scope of work, Catalytic's manpower rose from a pre-shutdown level of 181 men on December 21 to 480 men on January 8,

FIGHT FOAM FAST!

with SAG

SILICONE ANTIFOAM

CHEMICAL processors who use SAG Silicone Antifoam have made tremendous strides in fighting or controlling foam in many applications.

After a recent trial of SAG 47 Antifoam in a chemical plant, one customer reported: "This proves to be an excellent product for us. It requires smaller concentrations than previously used competitive products because of its lower viscosity and excellent dispersibility."

Years of research went into development of SAG Antifoams to make them *fight foam fast.* There are three types: SAG 470 Emulsion for aqueous systems; SAG 47 Fluid for non-aqueous systems; SAG 471 Fluid for durability in systems employing vigorous agitation. All products are shipped ready to use. And they're stable in storage. Mail coupon today for samples and technical information.

UNION CARBIDE **SILICONES**

Dept. FG-4001

Silicones Division, Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.
(In Canada: Union Carbide Canada Limited, Bakelite Division, Toronto 12.)

Send sample of ☐ SAG 470 Emulsion; ☐ SAG 47 Fluid; ☐ SAG 471 Fluid.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

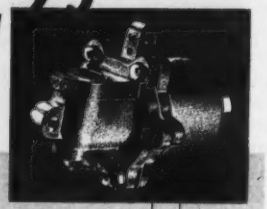
CITY _____ ZONE _____ STATE _____

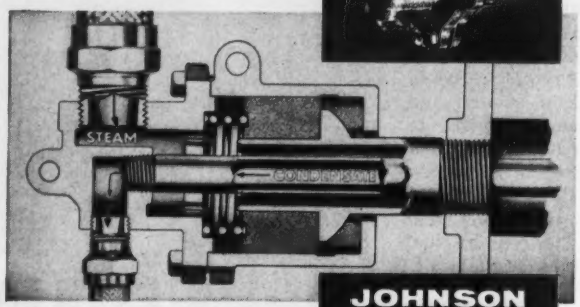
"Union Carbide" and "SAG" are trade marks of UCC.

Check 1368 opposite last page.

Need a rotary joint?

. . . for water-cooled or steam-heated rolls . . .





JOHNSON Rotary Pressure JOINTS

Type SB illustrated is completely self-supporting. For fully engineering data write for Bulletin S-3002.

Johnson started the whole idea . . . is far ahead in know-how, available types and sizes. Johnson Joints are completely packless, need no lubrication or adjustment. Used on dryer rolls, mills, waxers, calenders, slashers, printing presses, etc.—handling steam, water, hot heat transfer oils, Dowtherm, Mansanto Aroclors, etc. Actually serving under pressures as high as 2400 psi. Sizes up to 8".

THE JOHNSON CORPORATION
826 Wood St., Three Rivers, Michigan

Check 1369 opposite last page.

VACUUM

LAMMERT PUMPS

No matter what you need vacuum for, you will get dependable service from automatically lubricated Lammert pumps. Capacities—4.3 to 225 cubic feet per minute. From medium to high vacuum (up to 20 microns of barometer).

Write for catalog showing the complete line, including specifications, of Lammert pumps and compressors.

LAMMERT & MANN CO., INC.
1753 Walnut Street, Chicago 12, Illinois, SEeley 3-0383

Check 1370 opposite last page.

Contract Maintenance

From preceding page

and then to a peak of 924 men on January 22. By January 29, the payroll was down to 375 and was back to 181 a week later. All units were back in operation by January 29.

Turnaround contract maintenance has been handled for a number of years by Procon Incorporated of Des Plaines, Illinois (near Chicago). Procon normally supplies only supervisory personnel from its permanent construction force and hires labor locally. Familiarity of Procon with refineries through its construction activities and its knowledge of processes gained through years of process design and engineering, enables it to do an efficient job. Procon is particularly adept in advance planning for turnarounds.

Much contract maintenance is done in general area of contractor where he has an advantage due either to a readily available supply of labor or easy accessibility for supervision. Along this line, some engineering companies located on the West Coast are active in the CM field in that area. However, Catalytic Construction states that it does and can go in any area with the same results.

Specialized Business

Some of the major engineering firms on the East Coast have engaged in contract maintenance in varying degrees. However, it is a specialized business and one that cannot be considered a sideline. It requires much planning and concentration on the part of the contractor for success. Hence, it is not expected that a large number of firms will be entering the field.

Along the same line, it is not likely that many chemical processing plants will start using contract maintenance overnight. Principal factor preventing this is the fact that it is not easy to switch over to CM in an established plant. However, with many new plants coming on the scene and others being expanded, contract maintenance will continue to show steady growth in the CPI. ■

AUTOMATION IN

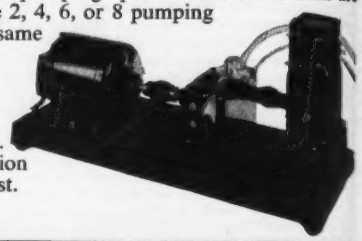
COLUMN CHROMATOGRAPHY

with the SIGMAMOTOR PUMP

Vernier Adjustment Insures Accuracy at Low Flows

Various column chromatography metering operations are simplified by the use of a peristaltic type constant volume pump, such as the Sigmamotor Model T-8. A typical installation combines the Sigmamotor pump with solenoid actuated valves and timing equipment to deliver elutant buffers into ion exchange columns on a reproducible schedule. The T-8 pump is equipped with vernier for accurate flow adjustment.

Single Sigmamotor units can be provided to handle 1, 2, 3, or 4 simultaneous pumping operations. Double units are available to handle 2, 4, 6, or 8 pumping operations at the same time. Capacities from 1 cc to 250 cc/minute are obtained by the vernier adjustment. Complete information available on request.



SIGMAMOTOR Inc.
18 NORTH MAIN STREET • MIDDLEPORT, NEW YORK

Check 1371 opposite last page.

SPLIT-EYELET CONNECTORS

For faster, easier connection of spray nozzles, branch lines and equipment to piping and tubing carrying liquids, gases or air up to 250 psi. Write for Bulletin 93.

FOR BETTER PERFORMANCE

SPRAY NOZZLE ACCESSORIES

ADJUSTABLE JOINTS

For easy, exact adjustment of spray direction. Made in size for ¼" to 2½" pipe in brass, steel and stainless steel. Write for Bulletin 97.

. . . EASIER INSTALLATION

FOR COMPLETE SPRAY NOZZLE INFORMATION WRITE FOR CATALOG 24

LINE STRAINERS

Special non-collapsing screen design for pressures up to 125 psi, for all pipe lines from ¼" to 6" size. Also high pressure strainers for up to 5,000 psi service. Write for Bulletin 94.

SPRAYING SYSTEMS CO.
3216 RANDOLPH STREET • BELLWOOD, ILL.

Check 1372 opposite last page.

manufacturers' current literature

This section features a variety of literature currently available from manufacturers. See also the other sections in this issue for new literature pertaining to those particular sections

Separation and Size Reduction

Roller mill, which has successfully ground pepper to −40 mesh at production rates of 2 to 3000 lb/-hr, is specified in Bul 153-A—Sprout-Waldron.

Check 1373 opposite last page.

Dicing cutters have speeds of to 2400 rpm (standard). Cutter head may be equipped with 2 to 16 fly knives for cross-cutting. Complete line is explained in Dicing Cutters 800 Bul—Taylor, Stiles & Company.

Check 1374 opposite last page.

Fluid-energy mills, in addition to grinding, can dehydrate, coat particles, blend and achieve chemical changes. Mills are tabulated in Jet-O-Mizer Mill Bul—Fluid Energy Processing & Equipment Company.

Check 1375 opposite last page.

Mullers, in which kneading, smearing and spatulate action coats one material with another, are topic of discussion of Mulling Handbook—Simpson Mix-Muller Division, National Engineering Company.

Check 1376 opposite last page.

Air-separation formulas are highlighted in booklet considering use of centrifugal units for range of 60 to 400 mesh. Air-separation Formulas Bul—Rubert M. Gay Division, Universal Road Machinery Co.

Check 1377 opposite last page.

Valves

Gear-operation switch is made easily with standard and universal operator, readily mounted on manufacturer's iron and steel gate valves in sizes of 6 to 36", in outside-screw-and-yoke or non-rising-stem patterns. No special yoke castings or brackets are needed . . . just basic gear operator and simple two-piece adapter. Unit is detailed in Converto-Gear Bul—Industrial Products Group, Crane Company.

Check 1378 opposite last page.

Valves are subject of 11 publications: Semi-steel valves (V-203), corrosion-resistant valves (V-217), coated valves (V-614), lubricated spherical plug valves (V-607), power operators (V-214), lubricated plug valves (Condensed Cat), steel 1000-psi valves (V-611), lubricating and servicing instructions (V-218), lubricant recommendations (V-220), maintenance and instruction manual (V-616), water-transmission valves (V-612)—Rockwell Manufacturing Company.

Check 1379 opposite last page.

Ball valve is interchangeable with screwed, socket-weld, butt-weld, flanged Victaulic and special connections. This type and complete ball valve line is reviewed in Cat BVF—Cooper Alloy Corporation.

Check 1380 opposite last page.

Globe and angle valves each incorporate Teflon V-ring pressure seal which is spring-loaded. They also include Teflon seat discs. Ductile-iron units are explained in TA Valve Bul L-475—The Bastian-Blessing Co.

Check 1381 opposite last page.

Butterfly valves of wafer type with spool-type rubber liner and flanged type with spool-type rubber and worm-gear manual operator are covered in Buls 583 and 582, respectively—W. S. Rockwell Co.

Check 1382 opposite last page.

Check valves for water-hammer protection come up for consideration in three bulletins. Pressure-loss tests (659), check valves (654), and cause, effect and control of water hammer (851). Buls 659, 654 and 851—The Williams Gauge Co., Inc.

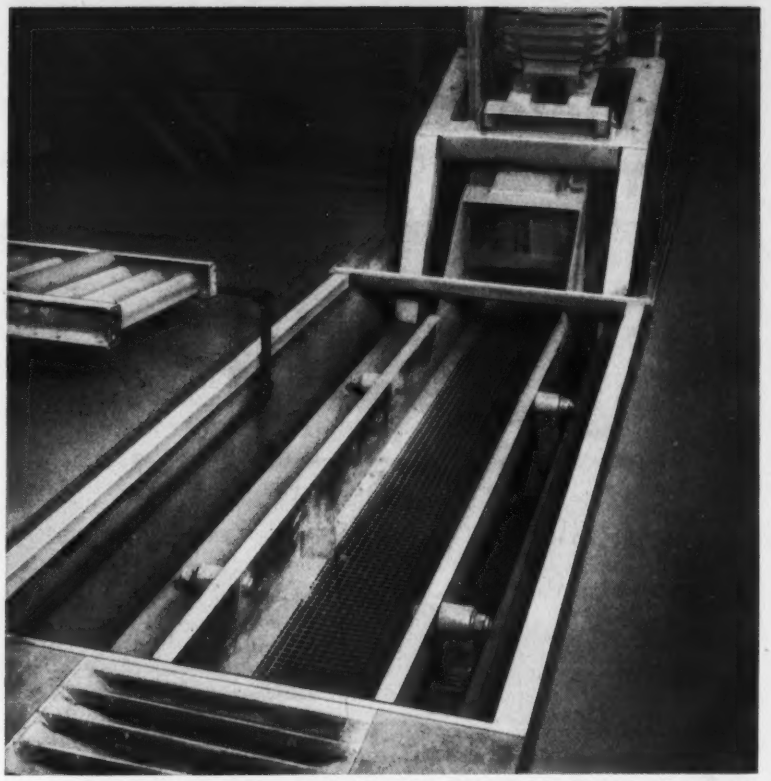
Check 1383 opposite last page.

Valves, fittings, flanges and unions of forged steel are depicted in Forged-steel Valves Cat—Henry Vogt Machine Co.

Check 1384 opposite last page.

Extended-bonnet valves, for handling liquid and gaseous fluids, such as oxygen, nitrogen, helium and hydrogen, are outlined in Extended-bonnet Valves Cat—The Wm. Powell Company.

Check 1385 opposite last page.



Photographs shows an Ajax Lo-Veyor installed out of the way below the floor. Floor grids similar to those shown in foreground removed to show arrangement of combination conveyor pan and screen.

AJAX Vibrating Conveyors
Do Two Or More Jobs

for price of one machine

With today's skyrocketing costs, the importance of reducing non-productive expense was never more urgent. Large and small plants are saving money in first cost, processing cost, and maintenance cost with Ajax Lo-Veyors engineered to fit your requirements.

Photograph shows an installation designed to simplify and speed up handling and separating bulk materials flowing from 10 production lines.

Send for latest AJAX SELECTION GUIDE

Learn how Ajax Vibration Engineering Service can help you cut your costs. Phone, write, or send coupon for your copy of this helpful book.

AJAX

AJAX FLEXIBLE COUPLING CO. INC.
24 Portage Road, Westfield, N.Y.
In Canada—The Alexander Fleck, Ltd., Ottawa

Please send Ajax Lo-Veyor Selection Guide to

Name_____

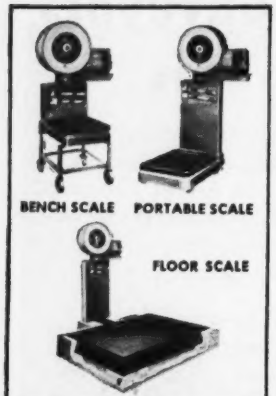
Concern_____

Address_____

Check 1386 opposite last page.

TOLEDO SCALES that PRINT Complete Weight Records for You . . .

. . . **THE ANSWER** to prevent "guesswork" and errors in cost control!



Toledo Printweigh Scales are available in a wide range of models, including Portable, Floor, and Bench types as illustrated; also Built-in, Hopper, Overhead Track and Motor Truck types.

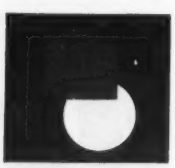
Human errors in reading, remembering and recording weights are eliminated with Toledo Printweigh "400" Scales. They're the surest way to satisfy your requirements for weight records that are complete and indisputable.

Weights are printed in full figures, even when unit weights are used. Choice of printing on 8½" x 11" forms, or on tickets; also on strips. Weight data may be transmitted electrically for recording on remote adding or other office machines. "Memory" feature available for printing weight data, even after load is removed.

Toledo Printweigh "400" Scales give new flexibility and efficiency in weighing . . . to cut costs, guard quality, prevent profit-stealing weighing errors. Ask your Toledo representative for the full story on Printweigh Scales, or WRITE TODAY FOR BULLETIN 2017. TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio
(Toledo Scale Co. of Canada, Ltd., Windsor, Ont.)

"MISFIT" SCALES MULTIPLY COSTS

Scales can become "misfits" as a result of changes in plant layout, materials handling, inventory controls, value or quantity of materials weighed. If this has happened in your plant, the results can be costly. For example: weighing errors, production bottlenecks, materials handling inefficiencies. Be sure your scales are adequate for the job. Ask your Toledo representative about a scale adequacy check in your plant, or send for the Toledo Weight Fact Kit.



SERVICE Factory Trained Self-Erters

TOLEDO® *Headquarters for Weighing Systems*

Check 1387 opposite last page.

CURRENT LITERATURE

Small solenoid valves are available in two types: conduit and grommet. They come in port sizes of ⅛ and ¼" NPT in ten orifice sizes in 3/64 through ¼" range. Valve, for pressures to 540 psi, are reviewed in Master-mite Valve Bul—Marsh Instrument Company.

Check 1388 opposite last page.

Split-body diaphram valves are interchangeable with regular globe-body diaphragm types of manufacturer (and with all standard makes of diaphragm valves). These control units are delineated in Cat 132—Kieley & Mueller, Inc.

Check 1389 opposite last page.

Valved couplings are made in ¼ to 6" sizes in aluminum, brass, steel and Types 303 and 316 stainless steel. Larger sizes and other metals are available on special order. Couplings are explained in Cat 58—Snap-Tite.

Check 1390 opposite last page.

Sampling valves are specified in Ram-type Valves Bul—Strahman Valves, Inc.

Check 1391 opposite last page.

Packaging

Sterile cold-filling of chemical materials in 55-gal drums is explained in Sterilpac Bul—Thermovac Inc., Subsidiary of Rheem Manufacturing Co.

Check 1392 opposite last page.

Gas cylinders which fully meet ICC inspections and tests are delineated in Cylinders Bul—Harrisburg Steel Co., Division of Harsco Corporation.

Check 1393 opposite last page.

Protective liners of polyethylene, polypropylene, vinyl and laminates, for use with drums, bags and cartons, are delineated in Protective Liners Bul—Protective Lining Corporation.

Check 1394 opposite last page.

Fluids Handling

Tube-fitting line includes complete selection of shapes for 1/16 through 1" OD tube. Fittings, which are available in all machineable metals and plastics, require neither special tools for installation nor special preparation of tube. Line is tabulated in Swagelok Fittings Bul—Crawford Fitting Company.

Check 1395 opposite last page.

Canned pumps combine pump and motor in single leak-proof unit. No shaft-sealing device is required. They are further specified in Chempump Bul—Chempump Division, Fostoria Corporation.

Check 1396 opposite last page.

Teflon tube retains flexibility at temperatures of −450 to +500°F. Further information may be found in Teflon Tube Bul—Pennsylvania Fluorocarbon Co., Inc.

Check 1397 opposite last page.

Heavy duty centrifugal sump and process pumps are being used by one company to circulate crude phthalic anhydride at 40 gpm from depth of 11′ at temperatures of 300 to 525°F. Specifications on this unit are reviewed in Bul 726.2—Goulds Pumps, Inc.

Check 1398 opposite last page.

Couplings and fittings of plain-end type, are available for joining standard or light-wall carbon or stainless steel, aluminum and other pipe materials. They are tabulated in Plainlock Fittings Bul—Victaulic Company of America.

Check 1399 opposite last page.

A close-coupled centrifugal pump is being used to pump radio-active waste water on first atomic-powered merchant ship. Unit, which is available in 23 sizes, capacities to 2000 gpm and heads to 400′, is detailed in Bul 710.1—Goulds Pumps, Inc.

Check 1400 opposite last page.

Steam-trap design incorporates only one moving part—stainless-steel disc. It is completely described in Steam Trap TD-50 Bul—Sarco Company Inc.

Check 1401 opposite last page.

Progressing-cavity pumps are available for capacities of 1/100 to 500 gpm at pressures to 1000 psi. Complete explanation of operating principle and tabulation of specifications is available in Bul 30 CP—Robbins & Myers, Inc.

Check 1402 opposite last page.

Steam-trap data, on selection and sizing of traps, how to install them for best results, and how to maintain them most economically, is information contained in 44-page book—Armstrong Machine Works.

Check 1403 opposite last page.

Pump-cup designs include conventional and 45° bevel types in full range of sizes for all reciprocating-pump and cylinder requirements. Bul 5903—Darling Valve & Manufacturing Co.

Check 1404 opposite last page.

THAT'S INTERESTING

Cocoon for space aces

A "cocoon" of plastic foam may be the answer to the problem of getting an astronaut safely back to earth. With this plan, proposed by a General Electric engineer, the space suit would be equipped with a plastic covering and attached tanks of foaming plastic and mixer. Upon leaving the space ship he would inflate the plastic covering which would be proper shape for re-entry and impact.

The "cocoon" would then fill with plastic foam—an outer hardened dense plastic would serve as heat shield while spongelike inner foam would serve as cushion. During re-entry heat would ablate dense foam.

For more information on product at right, specify 1405 see information request blank opposite last page.

Cost-cutting step taken 26 years ago still paying off at Hamm Brewery —they chose NONPAREIL Turbine Oil

Situation: In 1934 the Theo. Hamm Brewing Company installed two 1,000 kw. turbines. The brewing firm wanted to be sure there would be no downtime due to failure of the lubricant. Neither did the company want to spend time checking the oil's performance or adding new oil to sweeten the old.

What was done: Brewery management followed the advice of the Standard Oil lubrication specialist. They installed NONPAREIL Turbine Oil, the only oil, then as now, that carries with each fill a life-of-turbine guarantee.

What has happened: In 26 years since the turbines were put in service there has never been any downtime due to lubrication problems. In 1947 a 2500 kw. turbine was added to the system and another 3000 kw. unit was put in service in 1953. These, too, have used NONPAREIL Turbine Oil with the same results.

What you can do: Get the full story on NONPAREIL Turbine Oil from the Standard Oil office near you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about **NONPAREIL Turbine Oil**

- Will not permit formation of harmful acids
- Will not permit formation of sludge or oil varnish
- Will maintain good demulsibility or water separating characteristics
- Has high resistance to foaming
- Contains adequate rust inhibitor

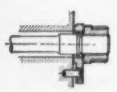
You expect more from **STANDARD** *and you get it!*

Hamm Brewing Co. assistant chief engineer Steve Wappel and Standard's Dick Anderson discuss recent oil analysis. Dick Anderson knows his way about an industrial power plant. He's been providing customers with technical service on lubrication for five years. Dick has an engineering degree from the University of Minnesota and has completed the Standard Oil Sales Engineering School.

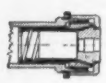
Industry's Newest Production Tool!

MOLYKOTE® G
LUBRICANT

Try it ...ON ANY OF THESE APPLICATIONS AND PROVE ITS LUBRICATING ABILITY!

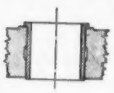


THREADED CONNECTIONS
No galling or seizing. Specified torque produces uniform tension.

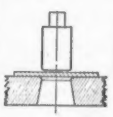


COLLET CHUCKS
Trouble-free opening and closing. No sticking.

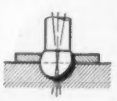
SPLINED SHAFTS & HEAVILY LOADED GEARS
Reduces fretting and wear. Also used for wearing in heavily loaded gears.



PRESS FITTING
Prevents galling, seizing, metal pick-up and distortion.



METAL FORMING
Makes difficult jobs easy and increases die life. Effective on punching and stamping tools.



SPHERICAL SEATS
Effective on spherical seats, rod end bearings, universal joints or wherever reciprocating motion exists.

POWER SCREWS
No galling or seizing.

Send for your FREE SAMPLE of MOLYKOTE G LUBRICANT today. We will also send a copy of our new Bulletin 126B-1 with complete details.

THE ALPHA-MOLYKOTE CORP. CP-11
65 Harvard Ave., Stamford, Conn.
Please send me a free sample of your MOLYKOTE G Lubricant.

NAME.....
TITLE.....
COMPANY.....
ADDRESS.....
CITY..... ZONE..... STATE.....

MOLYKOTE G *Lubricant*
Industry's Newest Production Tool

Check 1406 opposite last page.

CURRENT LITERATURE

Spray nozzles are topic of 48-page reference catalog which describes and illustrates units, and also gives detailed performance data on all types of nozzles, including spray volume and angle for each type and capacity. Cat 24—Spraying Systems Co.

Check 1407 opposite last page.

Plant Engineering and Maintenance

Wire cloth and screen is woven from stainless steel, Monel, bronze, copper, brass, high-carbon and oil-tempered steel, and virtually any metal that can be drawn into wire. Details are outlined in Cat 105—Ludlow-Saylor Wire Cloth Company.

Check 1408 opposite last page.

Wire cloth is available from stock in all alloys, weaves and meshes, to 244" wide in rolls or cut to size. It is indexed in Cat 57—Multi-Metal Wire Cloth Co., Inc.

Check 1409 opposite last page.

Carbon dioxide is available as dry ice (approximately 275 Btu/lb) or liquid @ 0°F (approximately 130 Btu/lb). This is discussed in Carbon Dioxide Bul—Chemicals Division, Olin Mathieson.

Check 1410 opposite last page.

Synchronous motor starters provide protection throughout entire sequence. Motor windings are protected and synchronization occurs at most favorable time. Line starters for 2200 to 4800v are detailed in Bul 8210—EC&M Division, Square D Company.

Check 1411 opposite last page.

Mechanical seals are specified in Cat 480—Durametallic Corp.

Check 1412 opposite last page.

Positive-infinitely variable speed drives incorporate all-metal self-tooth-forming chains to mesh with radially grooved wheels. They are available in 8 sizes, 16 standard types, and capacities of ½ to 25 hp. Full line is depicted in Book 2274—Link-Belt Company.

Check 1413 opposite last page.

Moving hot air at temperatures to 1700°F is job of fans with air-cooled shafts which are presented in Thermal-Aire Fans Bul—Garden City Fan & Blower Co.

Check 1414 opposite last page.

Insulation for heated storage tanks is subject of eight-page brochure outlining calculation of Btu and dollar waste by uninsulated tanks, vats and vessels. Tank Insulation Brochure—Gustin-Bacon Manufacturing Company.

Check 1415 opposite last page.

Would you like to receive CHEMICAL PROCESSING personally?

It will be sent to you without charge or obligation . . .

. . . if you qualify

. . . if you request it

If you are responsible for processing operations in an administrative capacity as plant superintendent, chemical engineer, chemist, engineer or equivalent responsibility . . . in a plant of substantial operations* where chemical processing is an important factor . . . CHEMICAL PROCESSING will be sent to you without charge or obligation if you request it. Use form below. In requesting, be sure to answer all questions. If your firm is not rated or listed in standard references, indicate size of the company by capacity, annual sales or number of employees. Unless all information is given, magazine will not be sent.

*"Substantial operations" does not necessarily mean an extremely large plant. But requests for the magazine exceed supply so we must set standards to insure publication being sent where it can be used to best advantage.

CHEMICAL PROCESSING
111 EAST DELAWARE PLACE
CHICAGO 11, ILLINOIS

Please send me CHEMICAL PROCESSING without charge or obligation

Name.....
Title.....
Company.....
Rating of Company.....
Street.....
City..... Zone.....
State.....
Main Products.....

CURRENT LITERATURE

V-belt drive, of type which has been operating for past year in application which went through six belts in 3 months formerly, is considered in V-Belt Drives Bul—The Gates Rubber Company.

Check 1416 opposite last page.

Protection of thermal insulation against fire damage is subject of Thermal-insulation Protection Bul—Benjamin Foster Company, Division of Amchem Products.

Check 1417 opposite last page.

Oil reclaimer reportedly maintains oil free of solids, water, fumes and acid in continuous all-electric automatic operation. It is subject of Oil Reclaimer Bul—The Hilliard Corporation.

Check 1418 opposite last page.

Wire-cloth and wire-screen selection, for purposes of grinding, sizing, scalping, dewatering or filtering, are discussed in Bul 160—The Cleveland Wire Cloth & Mfg. Co.

Check 1419 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Speed reducers have capacities to 170 hp and output speeds of 10 to 400 rpm. They are available in single- and double-reduction series, with 5:1, 15:1 and 25:1 ratios. Reducers are treated in 64-page Speed Reducer Bul—Dodge Manufacturing Corporation.

Check 1420 opposite last page.

Roof ventilators are designed to keep out snow, rain and sleet. They are rated to 78,000 cfm, and delineated in Bul 680-CP—Propellair, Division of Robbins & Myers, Inc.

Check 1421 opposite last page.

Wire cloth can be made in 53,000 different specifications. Subject is pursued in Wire Cloth Bul—The W. S. Tyler Company.

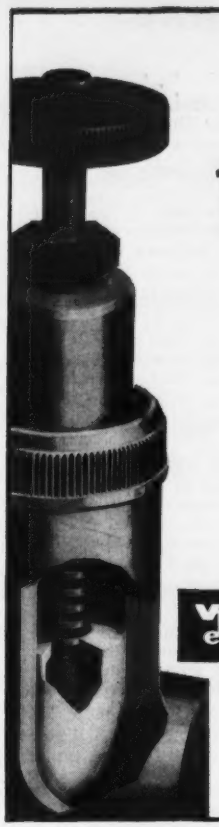
Check 1422 opposite last page.

Rotary pressure joints for water-cooled or steam-heated rolls are packless and need no lubrication or adjustment. Self-supporting type is illustrated in Bul S-3002—The Johnson Corporation.

Check 1423 opposite last page.

Air-intake units may be obtained with direct gas-fired heat units or steam coils, filter houses and filters, shutters and outlet diffusers. Bul A-117—Hartzell Propeller Fan Company, Division of Castle Hills Corp.

Check 1424 opposite last page.



THROTTLABLE
PLASTIC GATE VALVE
IN PENTON AND PVC

This valve combines the no-pressure-drop of a gate valve and the positive-throttle control of a globe valve. Designed with a free-to-swivel plug and seating on a different surface at each closure it gives longer wear. Suitable for vacuum service. Rated for 150 lbs. Available in PVC, Styrene-Copolymer and Penton with screwed, socket-weld or flanged ends. *Write for Catalog 42.0 today.*

Vanton
PUMP & EQUIPMENT CORP.
DIVISION OF COOPER ALLOY CORP.
HILLSIDE, NEW JERSEY

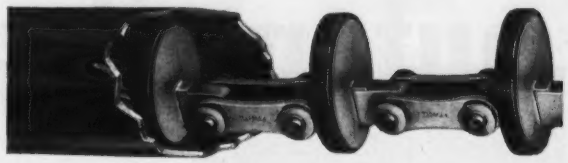
Check 1425 opposite last page.

Hapman Conveyors

offer you these outstanding features for your flowable material:

• Completely flexible • Compact • Self-cleaning
• Self-supporting • Self-feeding • Dust, odor-tight

almost always



cost more

. . . but return their cost many times. Sound engineering, superior materials and workmanship go into every Hapman installation. With Hapman tubular conveyors you have minimum wear, minimum degradation, and maximum trouble-free performance. This is why you may pay more initially, but with Hapman you can be sure of the best conveying system . . . and save in the long run.

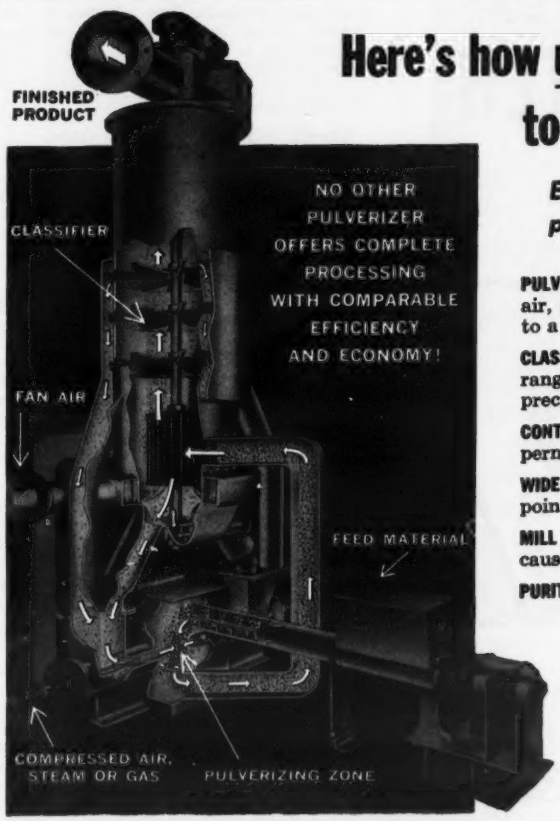
For Fact-Finding Report on Hapman Conveyors, write today to:

Dept. CP-11

Conveyor Division

HAPMAN CORPORATION
630 Gibson St. • Kalamazoo 6, Mich.

Check 1426 opposite last page.



Here's how unique MAJAC Jet Principle works to improve Pulverizing Process!

Economy and efficiency of exclusive Jet-Stream collision process unmatched by any other pulverizer!

PULVERIZES by collision of particles in high velocity jet streams of air, steam, or gas. Produces particle sizes as coarse as ⅛" down to a top size of a few microns.

CLASSIFIES with unusual efficiency and accuracy within a broad range of variable settings. Classifier integral but separately and precisely controlled.

CONTROLS HUMIDITY, dries, blends or coats material as desired. Even permits chemical reactions.

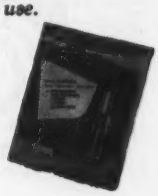
WIDE RANGE OF MATERIALS can be handled from soft low-melting point organics to hardest abrasive materials.

MILL WEAR and maintenance are reduced to absolute minimum because particles collide with each other instead of wearing mill.

PURITY is maintained at highest level because of minimum mill wear.

Sizes available for lab, pilot plant and production use.

Write today for detailed information or visit by qualified Majac representative.



MAJAC, INC.
Twenty-third St., Sharpsburg, Pittsburgh 15, Pa.

Designers and manufacturers of pulverizing, classifying and separating equipment for industry.

Check 1427 opposite last page.

DECOLORIZING, PURIFYING

CORN SYRUP automatically

VALLEZ ROTATING LEAF

PRESSURE FILTER

These Vallez rotating leaf pressure filters were designed specifically for removing color and purifying corn syrup. The complete filter element is all stainless steel type 316 construction, with special nylon filter cloth. The filters can be completely controlled by automation.

Write for complete detailed information on this and other G-B process equipment.

See our catalog in Chemical Engineering Catalog.

GOSLIN-BIRMINGHAM

MANUFACTURING CO., INC.

P. O. BOX 631 BIRMINGHAM, ALABAMA

FILTERS • EVAPORATORS • PROCESS EQUIPMENT • CONTRACT MANUFACTURING including HEAVY CASTINGS

Check 1428 opposite last page.

CURRENT LITERATURE

Hydraulic oil filter is specified in Oil Filter Bul—The Hilliard Corporation.

Check 1429 opposite last page.

Heat-exchanger tube is tabulated in Bul T-431—Tubular Products Division, The Babcock & Wilcox Company.

Check 1430 opposite last page.

Substations, of type capable of supplying 2000, kva are detailed in Substations Bul—Square D Company.

Check 1431 opposite last page.

Wire-cloth line can be fabricated from any metal or alloy including titanium in nine basic weaves. Further facts are covered in 102-page Wire Cloth Cat—The Cambridge Wire Cloth Co.

Check 1432 opposite last page.

Broken factory floors can be repaired without tie-up of traffic by means of an instant-setting concrete patch. It is further detailed in Instant-Use Brochure—Flexrock Company.

Check 1433 opposite last page.

Chemical Materials

Caustic soda is now available in new drum which flips completely open. Drum has 400- 450-lb capacity and is standard with caustic soda which is specified in bulletin available from Hooker Chemical Corporation.

Check 1434 opposite last page.

Shipping ethanolamines in tank cars, and the savings thereof over ordering in drum lots, is subject of Ethanolamines Shipping Bul—Union Carbide Chemicals Company, Division of Union Carbide Corporation.

Check 1435 opposite last page.

Sulfuric acid is subject of 40-pages of charts, graphs and facts. Technical manual incorporates up-to-date information on uses, manufacture, properties, storage, handling and analysis methods. "Sulfuric Acid"—General Chemical Division, Allied Chemical Corp.

Check 1436 opposite last page.

Silicone-defoamers facts and figures are summarized in eight-page manual, "ABC's of Defoaming"—Dow Corning Corporation.

Check 1437 opposite last page.

Chemical-materials line, including furfural, furfuryl alcohol, tetrahydrofurfuryl alcohol, furoic acid, hydrofuramide, furafil lignocellulose, and derivatives, is reviewed in 28-page Bul 201-A—Chemicals Dept., The Quaker Oats Company.

Check 1438 opposite last page.

Silicone antifoams are available in three types. Emulsion for aqueous systems (470), fluid for non-aqueous systems (47), and fluid for durability in systems employing vigorous agitation (471). Technical information on these is included in SAG 470 Emulsion, SAG 47 Fluid and SAG 471 Fluid Buls—Silicones Division, Union Carbide Corporation.

Check 1439 opposite last page.

Benzoyl peroxide is available in wet or dry form. It is specified in Benzoyl Peroxide Data Sheet—Lucidol Division, Wallace & Tiernan Incorporated.

Check 1440 opposite last page.

Drying and Heating

Electric radiant heaters are adjustable from 0 to 100% heating capacities. Units can be used to set-up zones of heat intensity by arranging heaters in different banks with individual controls for each. They are further detailed in Bul G62—Edwin L. Wiegand Co.

Check 1441 opposite last page.

Ovens and dryers of batch and conveyor types for service to 1000°F are available in gas, electric, steam, oil, and radio-frequency models. They are specified in Bul 157—Young Brothers Co.

Check 1442 opposite last page.

Heat exchangers, for application in cooling industrial machines or processes to temperatures approaching ambient wet-bulb, have closed coolant systems. They are delineated in Bul 132—Niagara Blower Company.

Check 1443 opposite last page.

Rotary kilns incorporate floating-type roller ring and roller supports for alignment. They are detailed in Bul 1115—Traylor Engineering & Manufacturing, Division of Fuller Company, Subsidiary of General American Transportation Corporation.

Check 1444 opposite last page.

Ovens are subject of a bulletin which describes, among others, a truck version, with doors at both ends for sintering ores at 1200°F, and an electric tray-loading model, for cross-flow heating to 500°F. These and others are covered in Bul 127—W. S. Rockwell Co.

Check 1445 opposite last page.

Water-tube boilers are available in sizes of 18 to 2000 bhp for pressures of 5 to 900 psi. Automatic units are discussed in Water-tube Boilers Bul—Vapor Heating Corporation.

Check 1446 opposite last page.

Would you like to receive CHEMICAL PROCESSING personally?

It will be sent to you without charge or obligation . . .

. . . if you qualify

. . . if you request it

If you are responsible for processing operations in an administrative capacity as plant superintendent, chemical engineer, chemist, engineer or equivalent responsibility . . . in a plant of substantial operations* where chemical processing is an important factor . . . CHEMICAL PROCESSING will be sent to you without charge or obligation if you request it. Use form below. In requesting, be sure to answer all questions. If your firm is not rated or listed in standard references, indicate size of the company by capacity, annual sales or number of employees. Unless all information is given, magazine will not be sent.

*"Substantial operations" does not necessarily mean an extremely large plant. But requests for the magazine exceed supply so we must set standards to insure publication being sent where it can be used to best advantage.

CHEMICAL PROCESSING
111 EAST DELAWARE PLACE
CHICAGO 11, ILLINOIS

Please send me CHEMICAL PROCESSING without charge or obligation

Name

Title

Company

Rating of Company

Street

City Zone

State

Main Products

CURRENT LITERATURE

Dryer construction incorporates prefabricated structure with trussed-and-tensioned insulated panels. This is reviewed in Drying Equipment Bul—The National Drying Machinery Company.

Check 1448 opposite last page.

Tumble dryers automatically control temperature at 30 to 90°C. They are detailed in 12-page brochure C—Paul O. Abbe Inc.

Check 1449 opposite last page.

Silicon-carbide heating elements, for heating in oxidizing or reducing atmospheres, are covered in Bul H—Globar Plant, Refractories Division, Carborundum Co.

Check 1450 opposite last page.

Dehydrators of steam and electric-reactivated types may be obtained in internal or external styles. Units are illustrated in Dehydrators Bul—Selas Corporation of America.

Check 1451 opposite last page.

Corrosion Control

Pulp and storage tanks, in 500- to 2000-gal and 1000- to 5000-gal capacities respectively, are tabulated in Pulp and Storage Tanks Buls—Lee Metal Products Company, Inc.

Check 1452 opposite last page.

Portable pumping units for corrosive services are tabulated in Pumpmobile Bul—Eco Engineering Company.

Check 1453 opposite last page.

Customized porcelain shapes are considered in Porcelain Bul—Process Equipment Division, Lapp Insulator Co. Inc.

Check 1454 opposite last page.

Sealless plastic pumps are available in capacities of 40 gpm, to discharge pressures of 40 psi, for temperatures of −60 to +350°F. Additional facts are outlined in Booklet 10A—Vanton Pump & Equipment Corp., Division of Cooper Alloy Corp.

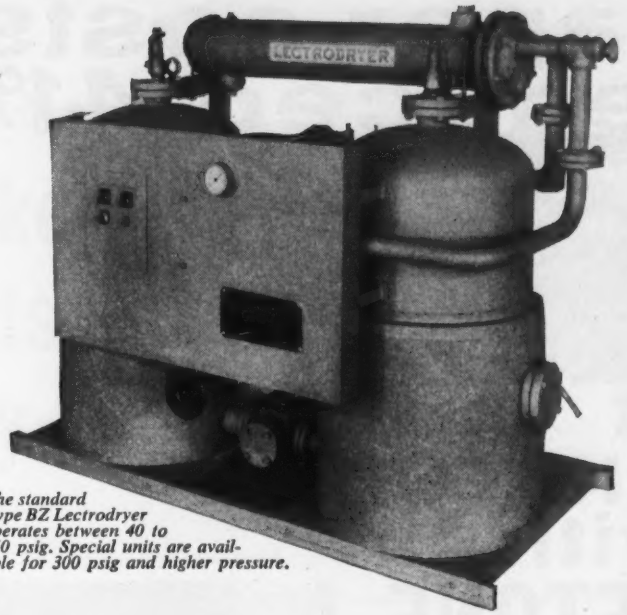
Check 1455 opposite last page.

Vacuum pans, in capacities of 10 to 500 gal, and quick-cooling pans, with capacities of 50 to 200 gal, are subjects of Vacuum and Quick-cooling Pans Buls—Lee Metal Products Company, Inc.

Check 1456 opposite last page.

Tube and pipe is centrifugally cast thermoset, epoxy resin-reinforced. The corrosion-resistant line is detailed in Fibercast Tube and Pipe Bul—Fibercast Company, Division of Youngstown Sheet and Tube Company.

Check 1457 opposite last page.



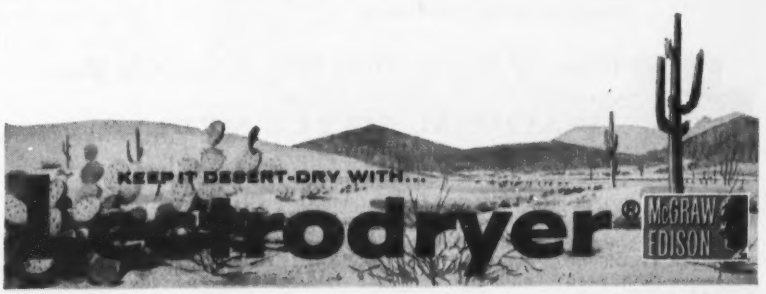
The standard Type BZ Lectrodryer operates between 40 to 150 psig. Special units are available for 300 psig and higher pressure.

NEW "BZ" LECTRODRYER for drying instrument air and other gases

For years, Lectrodryer has been known for leadership in the design and production of adsorbent dryers . . . with a reputation for providing extra peak load capacity, greater drying dependability. Now here's an even *better* dryer for compressed air and other gases—the new Type BZ Lectrodryer.

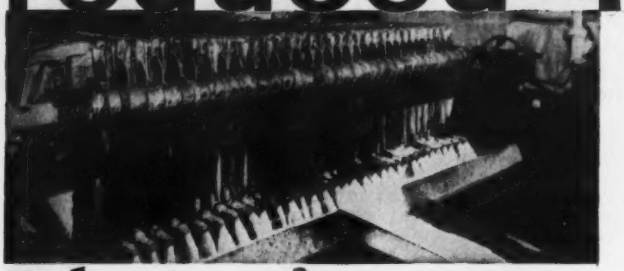
Special emphasis has been placed in the Type BZ Lectrodryer on sound but *simplified* mechanical design. It is fully automatic, supplying continuous drying with no attention other than occasional lubrication. Since the valves and valve mechanism move only a few times per day, there is virtually no wear—unlike units which cycle frequently.

Bulletin BZ-161 describes this new Lectrodryer in detail. For a copy, or for drying help, write Pittsburgh Lectrodryer Division, McGraw-Edison Company, 352 32nd Street, Pittsburgh 30, Pa.



Check 1458 opposite last page.

annual filter paper costs reduced 41%



at ANACONDA® with NETONE FILTER PAPER

- *Netone has service life of 12 cycles (old paper lasted one cycle)*
- *Easier to put on filter press, less installation damage*
- *Shows excellent resistance to solution shock*

At The Anaconda Company, Electrolytic Zinc Plant, located at Anaconda, Montana, Netone filter paper has been used exclusively on the Shriver filter presses since January 1, 1955. Netone is a heavy, neoprene filled paper possessing remarkable wet strength characteristics.

Prior to the use of the Netone paper on the Shriver presses, it was necessary to discard the kraft paper sheets then in use each time a press was cleaned. The life of the Netone paper in the same service is an average of 12 press cycles. Due to its greater wet strength, the Netone paper is less apt to be damaged during installation and has greater resistance to rupture from solution shock when the press is put in service.

Annual filter paper costs have been reduced 41%. The savings in labor and filter down time are also considerable.

Why not try NETONE Filter Paper on your filter? Test samples on request, no obligation, of course.

Weavers of Industrial Filter Media for over Fifty Years

NATIONAL FILTER MEDIA *Corporation*

General Offices and Mills: New Haven 14, Conn.
Western Office and Factory: Salt Lake City 10, Utah
Sales Offices—Representatives

Atlanta, Georgia: 990 Lindridge, N. E.
Cleveland 39, Ohio: P.O. Box 9407
Alhambra (L. A. Area), California: 20 South 1st Street
Chicago, Illinois: 6034 N. Cicero Avenue
Maquinaria Minera e Industrial, S.A. Mexico, D. F., Apartado #215
Houston, Texas: 1607 Jefferson Avenue
Toronto, Ontario: C.P.R. Roadway, 1119 Yonge Street

Check 1459 opposite last page.

CURRENT LITERATURE

Expansion joints and couplings of Teflon are made from single piece in standard pipe sizes of 1 to 12". Designed for pressures of 20 to 85 psi, they are expanded upon in Joints and Couplings Bul—Plastic Products Division, Raybestos-Manhattan, Inc.

Check 1460 opposite last page.

Gear pumps were formerly made only in ⅜ and ¾" port sizes for capacities to 3 and 10 gpm, respectively. They are now available in new series with 1-½" ports and comparably higher capacities. Designed for handling hazardous and corrosive fluids, line is covered in Gearchem Bul—Eco Engineering Company.

Check 1461 opposite last page.

Stainless-steel fittings for light-wall Schedules 5 or 10 pipe, are covered in Speedline Fittings Cat—Horace T. Potts Company.

Check 1462 opposite last page.

Plastic centrifugal pumps of PVC and polypropylene are available in capacities of 10 through 180 gpm, discharge heads to 160'. Complete specifications are included in Bul 11A—Vanton Pump & Equipment Corp., Division of Cooper Alloy Corp.

Check 1463 opposite last page.

Copper-base alloy's resistance to abrasion, erosion and corrosion, in addition to its spark resistance, are discussed in Ampco Metal Bul—Ampco Metal Inc.

Check 1464 opposite last page.

Data on Penton's chemical resistance to more than 300 reagents and complete listing of fabricators and suppliers of Penton processing equipment are subjects taken up respectively in "ABC's of Penton for Corrosion Resistance" and "Penton Buyers Guide"—Hercules Powder Company, Incorporated.

Check 1465 opposite last page.

Centrifugal pumps of Carpenter-20 stainless steel with Teflon and ceramic mechanical seals are considered in Centri-Chem Bul—Eco Engineering Company.

Check 1466 opposite last page.

Rotary pumps for handling corrosive and hazardous processing fluids are specified in All-Chem and Minilab Buls—Eco Engineering Company.

Check 1467 opposite last page.

Throttlable gate valves are available in Penton, PVC and styrene copolymer with socket-weld, screwed or flanged ends. Size range available is ½ to 2" and valves are rated to 150 psi. Line is expanded upon in Cat 42A—Vanton Pump & Equipment Corp., Division of Cooper Alloy Corp.

Check 1468 opposite last page.

Have you changed your address recently?

● If so, you'll want to insure that your copy of CHEMICAL PROCESSING reaches you without interruption. Just send us your new address . . . use the handy form below.

Please answer all questions in regard to your new affiliation, and in addition give us your former address including company, city and state.

mail this request to
READER SERVICE DEPT.
CHEMICAL PROCESSING
111 East Delaware Place
Chicago 11, Illinois

Former Company Affiliation .....

Former Address .....

Your Name ..... Present Title .....

Present Company .....

Main Product .....

Rating of Company .....

Street Address .....

City ..... Zone No. ..... State .....

Teflon packings of square-braided type are available in variety of types and all sizes in standard 1/16" increments from ⅛ to ¾" square, in spool or coil forms. They are reviewed in Bul CP-552 —Chemical & Power Products, Inc.

Check 1469 opposite last page.

Valve line is designed for applications with fluids which are hazardous and/or corrosive. It is indexed in Gear-Vac Bul—Eco Engineering Company.

Check 1470 opposite last page.

Rubber-lined tanks for storing and handling corrosives incorporate multi-calendered sheets of natural or synthetic rubber. They are expanded upon in Cat 7115—Manhattan Rubber Division, Raybestos-Manhattan, Inc.

Check 1471 opposite last page.

Kettle line includes 2/3-jacketed, 80- to 300-gal (CW); 2/3-jacketed, 5- to 500 gal (A); 2/3-jacketed, 5- to 100-gal (C); center-line scraper-agitator, 80- to 300-gal (CW3T); full-jacketed, 10- to 300-gal (B); and 2/3-jacketed, 40- to 200-gal (Pressure) models. These are pictured in A, B, C, CW, CW3T, and Pressure Kettle Buls—Lee Metal Products Company, Inc.

Check 1472 opposite last page.

Valves designed for corrosion resistance are available in wide variety of alloys to meet specific conditions of particular applications. The valves are available in such metals as Types 304 and 316 stainless steel, Aloyco 20, nickel, Monel, and Hastelloy B, C and D. This topic is further discussed in Alloy Valves Bul—Alloy Steel Products Company, Linden, N.J.

Check 1473 opposite last page.

Processing Equipment

Rotating-leaf pressure filters are designed specifically for removing color and purifying corn syrup. They are specified in Vallez Filter Bul—Goslin-Birmingham Manufacturing Co.

Check 1474 opposite last page.

Use of Venturi gas scrubbers to solve air-pollution problems is discussed in Venturi Gas Scrubbers Bul—Gas Scrubber Division, Chemical Construction Corporation.

Check 1475 opposite last page.

Processing equipment can be built and delivered on barges or sea-goings vessels by fabricator. Line is presented in Processing Equipment Bul—Sun Shipbuilding & Dry Dock Company.

Check 1476 opposite last page.

TEST AFTER TEST PROVES...

Heavy-duty Nickel Plating protects product purity

Here are some examples of corrosion-test results that indicate the ability of wrought Nickel to resist corrosion by a variety of chemical compounds under many conditions.

With these test results as a basis, the corrosion-resistance of *plated* Nickel coatings can be predicted with considerable precision.

Where you don't need solid corrosion-resisting materials, a substantial coating of plated Nickel on process equipment resists a variety of corrosives and protects product purity.

With a thick layer of corrosion-resisting Nickel between basis metal and corrosive media, your products *remain pure*. And your equipment lasts longer, protected by plated armor of Nickel.

Today your new equipment can be Nickel Plated before or after fabrication. New equipment can be made from pre-plated steel or other metals, available from electroplaters in a variety of mill forms with a heavy, uniform coating of Nickel.

Equipment already fabricated can be protected by electroplating with Nickel. The chemical-reduction process called electroless plating can be used to apply a corrosion-resisting layer of high-Nickel alloy even on inside surfaces and over the most complex shapes.

Yours for the asking. You can easily get further information about heavy-duty Nickel Plating . . . including additional test results and a table of corrosion-resistance ratings for Nickel Plating in contact with 53 corrosive media. Write for a copy of the new 20-page booklet, "Industrial Nickel Plating."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

INCO TRADE MARK **Inco Nickel**

TEST
CAUSTIC SODA: Test spool immersed for 47 days at point 10 feet from bottom of storage tank containing 76% caustic soda. Temp. 230°F. No aeration. No agitation except that due to top-filling of tank.

RESULT
Average Nickel corrosion rate: .00008 ipy

TEST
VINYL CHLORIDE: Test spool exposed for 56.5 days in still in contact with liquid and vapors of pure vinyl chloride with traces of aldehydes, ethylidene dichloride, and iron salts. HCl gas and acetylene content less than .0001%. Temp. 100°F, pressure about 60 psi gauge, no aeration.

RESULT
Average Nickel corrosion rate: .0003 ipy

TEST
GLYCERINE-SALT: Test spool exposed 31 days, resting on the bottom of a scale tank with iron cooling coils in crude mixture containing 81% glycerine, 8 to 10% sodium chloride, and 7% water. Average temp. 240°F (70° to 280°F). Solution pumped in and out of tank continually at about 200 pounds per minute. No aeration.

RESULT
Average Nickel corrosion rate: .00006 ipy

TEST
AMYL PHENOL: Test spool exposed for 50 days in still used in production of amyl phenol. Still contained sulfuric acid, phenol, amyl phenol, and phenol sulfonic acid. Temp. 392°F. No aeration. Agitation by boiling. No pitting observed.

RESULT
Average Nickel corrosion rate: .0007 ipy

TEST
CANE SUGAR JUICE: Test spool exposed 92 days in Dorr Thickener in hot sugar cane juice before clarification in refining of sugar. Temp. approx. 180°F. Vigorous agitation and aeration.

RESULT
Average Nickel corrosion rate: .0001 ipy

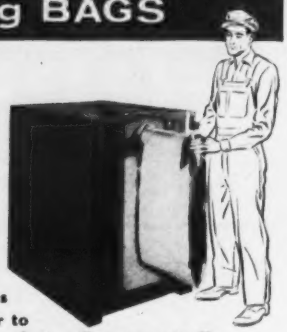
Check 1477 opposite last page.

CUT COSTS
for Packing BAGS

FILL and WEIGH with

CODDINGTON

AUGER-MATIC
Bag Packer



Low Cost, portable AUGER-MATIC packs any material from powder to pellets in paper bags . . . shuts off automatically when desired weight is reached.

Valve bags fit snugly on AUGER-MATIC spout so no dust escapes . . . keeps bags clean . . . eliminates costly tieing or bag closing equipment.

--------FILL OUT AND MAIL TODAY--------

E. D. CODDINGTON MFG. CO.
5036 N. 37th Street, Milwaukee 9, Wisconsin

Please send me facts on Cutting Valve Bag Packing Costs

MY NAME.....

COMPANY.....

ADDRESS.....

CITY.....ZONE.....STATE.....

Check 1478 opposite last page.

COPPUS "Blue Ribbon" Ventilator-Exhausters **are portable and easily adaptable . . . for exhausting welding fumes or foul air from enclosed vessels. Mail coupon below for facts.**

COPPUS ENGINEERING CORP.
391 Park Avenue, Worcester 10, Mass.

- ☐ in tanks, tank cars
- ☐ in underground manholes
- ☐ for exhausting welding fumes
- ☐ on boiler repair jobs
- ☐ for general man cooling
- ☐ to stir up stagnant air wherever men are working or material is drying

Name.....
Company.....
Address.....
City.....

COPPUS BLOWERS

Check 1479 opposite last page.

CURRENT LITERATURE

Rotary blenders start four-way blending while charging and continue during discharge to produce blends of dry and semi-dry materials within three to five minutes of charging start. They are expanded upon in Bul 080B—Sturtevant Mill Co.

Check 1480 opposite last page.

Mixers, in which complete mix is made in five revolutions, are available as hand- or power-operated models in capacities of 5 qt to 160 cu ft. Mixers are considered in Bul X-80—Daffin Manufacturing Co., Division of Daffin Corporation.

Check 1481 opposite last page.

Ion-exchange system of regeneration, whereby downward flow produces a barrier to keep bed from being expanded by upward flow of regenerant, is treated in Counterflow Bul—Illinois Water Treatment Co.

Check 1482 opposite last page.

Processing equipment, including units for sizing, weighing, classifying, screening, blending and conveying, is presented in Processing Equipment Cat—S. Howes Co., Inc.

Check 1483 opposite last page.

Portable mixers can be obtained in sizes of ⅛ to 3 hp. Shock overloads cannot damage mixer drives; gears will slip if overloaded more than 50%. These are reviewed in Bul B-520—Mixing Equipment.

Check 1484 opposite last page.

Oxygen and nitrogen is produced simultaneously in liquid or gas form by package-type plants. Details on these units are incorporated in Oxygen-nitrogen Plants Bul—Independent Engineering Co., Inc.

Check 1485 opposite last page.

Mixing, blending and tumbling loads to 1000 lb in drums can be done with stationary drum rotator. Any diam drum can be mounted by adjusting three bolts. Motor can be geared to give any fixed speed from 5 to 30 rpm. Line of rotators is reviewed in Drum Rotator Bul—Morse Manufacturing Co., Inc.

Check 1486 opposite last page.

Processing equipment, which is designed to be coordinated, is depicted in Processing Equipment Bul—Process Equipment Division, General American Transportation Corporation.

Check 1487 opposite last page.

Jet-Venturi equipment, including steam-jet vacuum pumps and dual condensing system for recovery of high-boiling components from water vapor, are specified in Jet-Venturi Equipment Bul—Croll-Reynolds Co., Inc.

Check 1488 opposite last page.

For Accurate TEMPERATURE RECORDS at MODERATE COST

RANGES AVAILABLE

Temperature Range	One Rotation of Chart
−30° to +120°F	7 Days
−30° to +120°F	24 Hours
−30° to + 50°F	24 Hours
−20° to + 40°F	7 Days
−10° to + 50°F	24 Hours
−10° to + 50°F	24 Hours
10° to 90°F	24 Hours
30° to 60°F	7 Days
40° to 100°F	24 Hours
40° to 100°F	24 Hours
50° to 130°F	24 Hours
60° to 90°F	8 Hours
60° to 90°F	24 Hours
70° to 130°F	24 Hours
−25° to + 10°C	24 Hours
5° to 40°C	24 Hours

Use TEMPSCRIBE Recorders

BULB-TYPE (illustrated)—*For recording temperatures at a distance*
BI-METAL TYPE — *For recording temperatures in surrounding air*

- Portable—easily carried. Can be set on flat surface or hung on wall.
- Spring-wound instrument-type clock: 3 standard movements—8 hours, 24 hours or 7 days.
- Instrument measures 4½" x 5½" x 7½"; uses 4¼" diameter charts.
- Chart graduations easy-to-read; spaced uniformly over full range.
- Pen and its actuating components are in door. Doors are completely interchangeable to convert to any temperature range, or from bi-metal type to bulb-type.

Also available: (1) Interchangeable door with electro-magnetic armature to record running time of motors, burners, solenoid valves, etc. (2) Two-pen doors for recording temperature and electrical operation on same chart.

Write for Leaflets 786 and 872

BACHARACH INDUSTRIAL INSTRUMENT CO.
200 N. BRADDOCK AVE. • PITTSBURGH 8, PA.

Check 1489 opposite last page.

More pay load...more profit

Dead weight is out...more pay load is in—when you use Hackney transportation equipment for liquefied compressed gases. Engineered from the ground up with features such as controlled stress-relieving, superior welding techniques and rear-end assemblies of high-quality components. Every Hackney unit is a complete package that meets all your needs, whether for highway or intra-plant service. Write for details.

Hackney

Pressed Steel Tank Company
Manufacturer of Hackney Products Since 1902
1463 South 66th Street, Milwaukee 14, Wisconsin
Branch offices in principal cities

COMPRESSED GAS CONTAINERS FROM ONE TO 30,000 GALLONS

Check 1490 opposite last page.

Automatic filter has plates in horizontal position. Filter incorporates automatic cake discharge. Complete cleaning operation is performed without opening filter. It is specified in Filter HRC Bul—Sparkler Manufacturing Company.

Check 1491 opposite last page.

Portable mixer consists of two rotating impellers and two stationary stators enclosed in cylindrical housing. Fine clearance between impellers and stators results in shearing action and turbulence. Units are specified in Shear-Flow Mixers Bul—Gabb Special Products Inc.

Check 1492 opposite last page.

Processing-equipment line . . . including mixers of various types, blenders, ball and pebble mills, extrusion and agglomeration equipment, vibrating screens, industrial fans and duct boosters, jar mills, and laboratory equipment . . . is covered by eight-page Bul 300—International Process Equipment Co. Div. of Patterson Foundry & Machine Co.

Check 1493 opposite last page.

Processing-equipment line, including crushers, mills, vibrating screens, rock and ore feeders, preheaters, kilns and kiln accessories, contact coolers, and other products, is pictured in eight-page Bul 59-E—Kennedy Van Saun Manufacturing & Engineering Corp.

Check 1494 opposite last page.

Process Instrumentation and Laboratory Apparatus

Recording-chart line has more than 15,000 different types in stock. Tabulation is included in Stock List—1960—Technical Sales Corporation, Subsidiary of Graphic Controls Corporation.

Check 1495 opposite last page.

Gas analyzers continuously analyze and simultaneously record on one chart from one to six constituents of a gas. Operation of unit is covered in detail in Gas Analyzers Bul—Cambridge Instrument Company Inc.

Check 1496 opposite last page.

Safe and accurate feeding of hazardous, corrosive or toxic chemicals is subject of Bul 1157-3—Milton Roy Company.

Check 1497 opposite last page.

Flexible heating cords for high-temperature laboratory heating applications can be combined with stepless temperature controller. System is discussed in Cal-Cord Bul—Glas-Col.

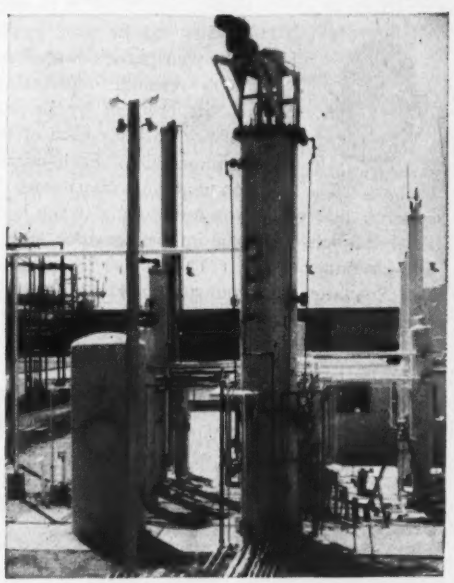
Check 1498 opposite last page.

13 COOPERATING COMPANIES* SELECT GENERAL AMERICAN RDC COLUMN FOR PROTOTYPE PLANT

Lignite low temperature tar is a relatively new and unknown raw material. To determine its potential value, a cooperative research program was started by 13 companies in 1954 at the Battelle Memorial Institute.

One of the important developments has been a solvent extraction process . . . a countercurrent extraction of this tar with 75% methanol—25% water and commercial hexane . . . using the RDC column. The development appeared so promising that a prototype plant was constructed at Alcoa's Rockdale Works by Texas Power & Light Company incorporating a General American RDC pilot column. *Only* the RDC column combines all these advantages: High volumetric efficiency, high throughput capacity, elimination of interstage settling, flexibility for changing feed conditions, lower power requirements, simple construction, tolerance for solids.

For any applications dealing with liquid-liquid, liquid-solid, liquid-slurry extraction . . . why not get full information on a General American RDC column? (Write for Bulletin #T-1159) Remember, *it pays to plan with General American.*



Process Equipment Division—Turbo-Mixers

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street
Chicago 3, Illinois
Offices in principal cities

TURBO-MIXER GENERAL AMERICAN TRADE MARK

*Names on request

EXCLUSIVE RDC LICENSEE IN THE PROCESS INDUSTRY

Check 1499 opposite last page.

Temperature transmitter is force-balance type unit. It is available in three range spans: 100°F, within limits of −40 to +300°F; and 200 and 400°F, within limits of −400 to +1000°F. Additional details are included in Bul 98293—Taylor Instrument Companies.

Check 1501 opposite last page.

Proportioning pumps have repetitive metering accuracy of ±1% when operating between 10 and 100% of capacity. They are available in two series. In one, simplex models pump to 13.1 gph at max pressure of 1000 psi. Second line's simplex models pump to 812 gph at max pressure of 1000 psi. Lines are covered in proportioning Pumps Bul—Pump Division, American Meter Company.

Check 1502 opposite last page.

Tape-program control for gas chromatograph consists of motor-driven transparent film in conjunction with photoelectric transmitter and receiver to provide any combination of time and sequence required. System is reviewed in Gas Chromatograph Bul—Instrument Division, Mine Safety Appliances Company.

Check 1503 opposite last page.

Bourdon tubes of Type-316 stainless steel are available for operating ranges of 30" vac to 75 psi, 10-100 psig, 30-400 psig, 75-800 psig, and 100-1000 psig. They are depicted in Bul 019—The Mercoid Corporation.

Check 1504 opposite last page.

Flow indicators are explained in four-page bulletin which outlines working principle and gives specifications. Flow Indicators Bul—McIntosh Equipment Corp.

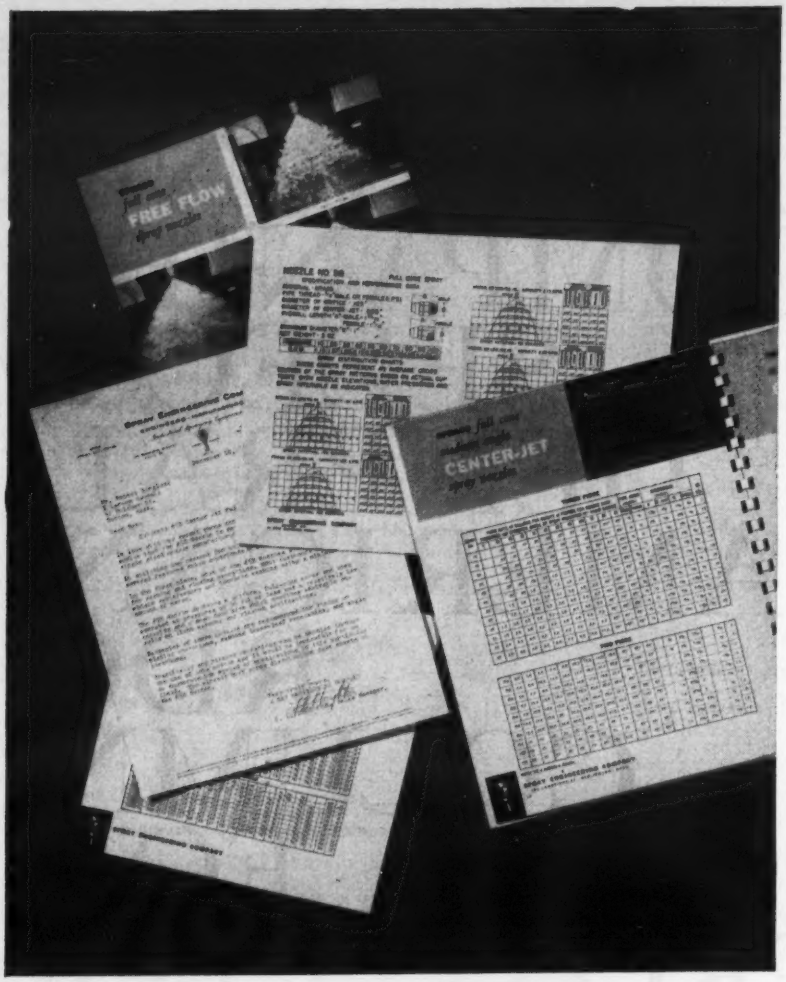
Check 1505 opposite last page.

Temperature-measurement equipment, including indicating, recording and controlling instruments and monitors, wire, connectors and thermocouples, are indexed in Temperature-measurement Bul—Thermo Electric Co., Inc.

Check 1506 opposite last page.

Liquid-level gages have liquid chambers each made in one piece from solid bar of carbon or alloy steel. Gages are topic of Cat 36—Penberthy Manufacturing Company, Division of Buffalo-Eclipse Corporation.

Check 1507 opposite last page.



NOW... "SPECS" AT YOUR FINGERTIPS

Here's a surer, easier way to specify spray nozzles

How can you be sure you're specifying the *right* spray nozzle for your particular application?

Spraco's research department has taken the guesswork out of this problem by preparing complete and accurate performance data for each of the hundreds of spray nozzles in the Spraco line. Each nozzle "profile" is complete with data on material, dimensions, flow rate, pressure, angle of spray . . . everything you need to enable you to choose, at a glance, the nozzle that will deliver maximum performance and efficiency in your particular application.

No matter what your spray nozzle problem, Spraco makes this information available to you absolutely free. Why not write and ask about it — today?

SPRAY ENGINEERING COMPANY
105 Cambridge Street, Burlington, Mass.

SPRACO

Check 1500 opposite last page.

New...from MARSH!

Conduit-type Mastermite. Grommet-type also available.

Small Solenoid Valves that fill a BIG Order

Designed to meet the need for positive-acting tight-seating valves for use on wide variety of media, including oxygen, hydrogen, acetylene, etc.

Two Types:
Conduit type and grommet type. Port sizes 1/8" and 1/4" NPT.

Ten orifice sizes: 3/64" through 1/4".

Wide range of voltages:
Standard with 115 V. A. C. but also available in 12, 24, 208, 230, 460 V. A. C.

Pressure to 540 psi.
Small, but with more strength in the Marsh manner. Coils never overheat. Entire assembly leak tight. Remarkably quiet operation. Cleanable without breaking connections. Used in any position. Bodies either brass bar stock or 18-8 stainless steel. All moving parts stainless. Underwriters' approved for use on oxygen and hydrogen and as safety valves.

Write for new bulletin

MARSH INSTRUMENT COMPANY
Dept. Z Skokie, Illinois
Division of Colorado Oil and Gas Corporation
Marsh Instrument & Valve Co., (Canada) Ltd., 8407 103rd St., Edmonton, Alberta, Canada, Houston Branch Plant, 1121 Rothwell St., Sect. 15, Houston, Texas.

Check 1508 opposite last page.

Resistance thermometers are simply operated. Temperature range between −50 and +700°F or −50 and +350°C is selected. Corresponding range card is placed in thermometer adapter and temperature range is set-up. Additional information on system is reviewed in Bul A-706-B—Swartwout Division, Crane Co.

Check 1509 opposite last page.

Column-chromatography metering operations can be simplified by use of peristaltic-type constant-volume pump. Unit is specified in Pump T-8 Bul—Sigmamotor Inc.

Check 1510 opposite last page.

Material Handling

Pneumatic conveyors of vacuum type employ positive-pressure exhausters for air supply. Systems are equipped with their own individual bag-type filters which are automatic in operation. They are subject of Pneumatic Conveying Bul—Fuller Company, Subsidiary of General American Transportation Corporation.

Check 1511 opposite last page.

Tubular-conveyor line is flexible, self-cleaning and self-supporting. It is specified in Fact-Finding Report—Conveyor Division, Hapman Corporation.

Check 1512 opposite last page.

Bulk feeders, which combine a vibrating-screw rotation with a vibrating hopper, trough and tube, are considered in Bulk Feeders Bul—Vibra-screw Feeders, Inc.

Check 1513 opposite last page.

Invertible bulk-handling bins are specified in Invert-a-bin Bul—The Powell Pressed Steel Company.

Check 1514 opposite last page.

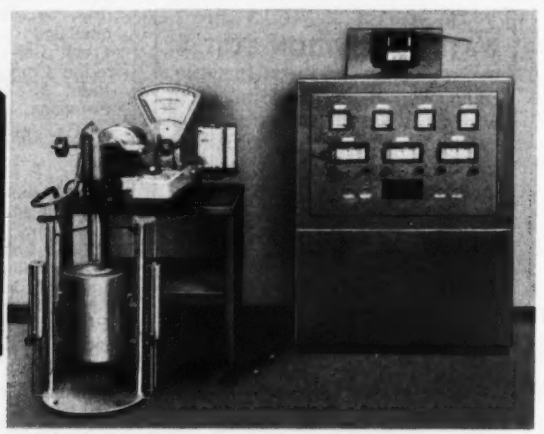
Material-handling-system controls are discussed in four-page Bulk-handling Controls Bul—Electronic Controls Division, Flo-Tronics, Inc.

Check 1515 opposite last page.

Fork-lift trucks incorporate new engines in which crater-shaped piston heads are utilized. Trucks are explained in Bul BU-640—Allis-Chalmers.

Check 1516 opposite last page.

NOW! accurately forecast and record plastic properties of materials to 1150°F.



C. W. BRABENDER PLASTICORDER

This high temperature recording plasticimeter incorporates the time-proven, C. W. BRABENDER PLASTOGRAPH and a measuring head of unique design with a vertical mixing chamber and shaft. Temperature uniformity is guaranteed at programmed rate of change or at constant temperatures from 575° to 1150°F. The C.W.B. PLASTICORDER accurately forecasts processability and records plastic flow of all materials at various shear rates under typical processing conditions. Control is maintained from a separate console.

SEE FOR YOURSELF! Bring or send us your samples for free testing. Write for technical application bulletins.

C.W. Brabender Instruments, Inc.

55 E. WESLEY ST., S. HACKENSACK, N.J.
DIAMOND 3-8425

Check 1517 opposite last page.

STOP COSTLY CORROSION DAMAGE...

COROBOND
. . . acid-proof cement used with Ceilcote Brick!
CEILCOTE E-900
. . . dependable coating for severe corrosion service!
CEILCRETE
. . . combined with glass cloth for extreme chemical resistance!
COROCRETE
. . . monolithic flooring four times stronger than concrete!

10021-CC

WITH CEILCOTE

ENGINEERED FLOORS

Ceilcote *Engineered Floors* are the answer to costly floor maintenance problems caused by acid and alkali attack. And Ceilcote floors are engineered to withstand impact, thermal shock, abrasion and expansion without cracking or spalling! The installation shown above exemplifies Ceilcote's comprehensive approach to individual flooring problems . . . demonstrates how Ceilcote materials are carefully integrated to completely protect all types of surfaces. Working under contract, competent Ceilcote engineers analyze your operating conditions . . . formulate materials . . . direct surface preparation and installation by Ceilcote construction crews. Some installations can be installed under Ceilcote supervision or by plant personnel. *This complete flooring package with guaranteed performance is available only from Ceilcote!*

Write today or call your nearest Ceilcote Representative . . .

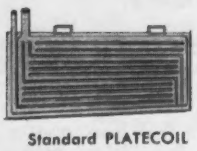
CEILCOTE

THE CEILCOTE COMPANY, INC.
4834 Ridge Road • Cleveland 9, Ohio

ALABAMA: BIRMINGHAM LY. 2-7201. CALIFORNIA: OAKLAND TE. 2-0103, SANTA ANA P.O. BOX 625. COLORADO: DENVER GL. 5-3651. WASHINGTON, D.C. OL. 6-4321. FLORIDA: CORAL GABLES MO. 5-1965. ILLINOIS: CHICAGO AN. 3-1881. INDIANA: EVANSVILLE HA. 3-3597. MASSACHUSETTS: SPRINGFIELD RE. 6-5203. MICHIGAN: DETROIT UN. 4-6871. MISSOURI: KANSAS CITY MI. 9-1312. NEW JERSEY: PRINCETON WA. 1-6969. NEW YORK: NEW YORK CO. 7-0276, ROCHESTER GR. 3-5918. N. CAROLINA: CHARLOTTE JA. 3-8784. OHIO: CINCINNATI EL. 1-5765, CLEVELAND ER. 1-4558. PENNSYLVANIA: PHILADELPHIA KI. 5-0720, PITTSBURGH AT. 1-8500. TENNESSEE: KNOXVILLE 2-5770. TEXAS: HOUSTON JA. 2-1606. WASHINGTON: SEATTLE SU. 3-9200. CANADA: OTTAWA CE. 3-7785.

Check 1518 opposite last page.

PLATECOIL®

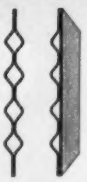


Standard PLATECOIL units

FACTORY-ASSEMBLED PLATECOIL banks

In factory-fabricated styles to fit your needs

ROLLED to specified diameters



SINGLE EMBOSSED OR DOUBLE EMBOSSED

The PLATECOIL units above are just a few of the many standard and special units that are effecting savings and better performance in a wide range of tank and process heating and cooling applications. If you are looking for faster heat up, more heat transfer in less space, savings on installation or maintenance or an answer to other heat transfer problems, it will pay you to investigate PLATECOIL.

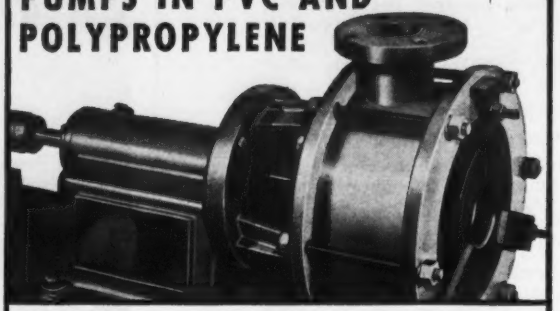
Send for free BULLETIN P54 for more information.

PLATECOIL® DIVISION

TRANTER MANUFACTURING, Inc.
LANSING 9, MICHIGAN

Check 1519 opposite last page.

VANTON CENTRIFUGAL PUMPS IN PVC AND POLYPROPYLENE



To handle HCl, H_2SO_4, most acids, greases, oils, plating solutions and many solvents, at temperatures up to 300° F. • Lower in cost than special alloy pumps. • Impellers are molded, dynamically balanced. • Extra heavy duty bearing pedestal. • Mechanical shaft seals in range of materials to cover virtually all corrosive applications. • Broad range of sizes. Capacity 10 through 180GPM. Discharge head to 160 feet. • Write for Bulletin 11A.

Vanton PUMP & EQUIPMENT CORP.

DIVISION OF COOPER ALLOY CORP., HILLSIDE, N. J.

Check 1520 opposite last page.

CURRENT LITERATURE

Bulk-handling containers are collapsible units made of high-strength cord fabric and synthetic rubber. These are topic of Sealdbins Bul—Transportation Products Dept., United States Rubber.

Check 1521 opposite last page.

Vibrating conveyors for variety of applications are considered in Vibrating Conveyors Bul—The Cleveland Vibrator Co.

Check 1522 opposite last page.

Picking right vibrating conveyor for particular application is subject of Lo-Veyor Selection Guide—Ajax Flexible Coupling Co., Inc.

Check 1523 opposite last page.

Scales incorporate printing of weights in full figures on 8½x11" forms, or on tickets or strips. Weight data may be transmitted electrically for recording on remote adding or other office machines. Scales are considered in Bul 2017—Toledo Scale, Division of Toledo Scale Corporation.

Check 1524 opposite last page.

Gas-operated fork-lift trucks are available in capacities of 3000 to 10,000 lb with cushion tires and 3000 to 8000 lb with pneumatic tires. Specifications on these are tabulated in Gas-operated Lift Truck Bul—Automatic Transportation Company, Division of The Yale & Towne Manufacturing Company.

Check 1525 opposite last page.

Tractor-shovels have two speeds forward and reverse, power steering, power-transfer differential, 4000-lb breakout force and 2500-lb operating capacity. They are topic of discussion of "Industrial Materials Handling . . ."—The Frank G. Hough Company, Subsidiary of International Harvester Company.

Check 1526 opposite last page.

Checkweigher handles bags from 25 to 150 lb in motion and detects weight variations as small as 1-½ oz or less per 100 lb. Speed is variable to 25 bags/min, depending on size and weight. Unit is specified in Bul 3376—The Exact Weight Scale Co.

Check 1527 opposite last page.

Bulk shipping by means of special railroad cars, designed for handling of dry, powdered and granular materials, is subject of Airslide and Dry-Flo Cars Bul—Airslide and Dry-Flo Car Division, General American Transportation Corporation.

Check 1528 opposite last page.

CLASSIFIED SECTION

CHEMICAL PROCESSING

EQUIPMENT & MATERIALS

TANK-O-METER
FOR MEASURING TANK CONTENTS ANY DISTANCE AWAY
ANY LIQUID
Uehling INSTRUMENT CO.
488 GETTY AVENUE, PATERSON, N. J.
SEND FOR BULLETIN 945

PIPE: All No. 1 Grade plain end and cleaned.

2,000,000 ft. to the foot	2"		3.50#
1,000,000 ft.	3"		7.70#
1,000,000 ft.	4"		10.98#
500,000 ft.	6"		19.80#
200,000 ft.	8⅝"		28#
400,000 ft.	10¾"		35#
75,000 ft.	12¾"		40#
50,000 ft.	18"		59#

INDIANA-OHIO PIPE CO
P.O. Box 5412 Shepard Station
Columbus 19, Ohio Phone C. L. 3-5527

RENTAL-PURCHASE PLAN CHEMICAL EQUIPMENT

Ideal for Pilot Plants, Pre-Production Testing.

Baker Perkins Double Arm Mixer UNE #7; Pressure Top, others up to 300 Gal. Cap.

J. H. Day 3 Roll 5"x12" Mill, other 3 Roll Mills to 16"x40".

S.S. Lab. Drum Dryer 8"x11½", other D.D. Dryers to 40"x120".

Bowen S/S Lab. Spray Dryer.

Fitzpatrick S/S JT Homoloid Mill.

Feinc S/S Rot. Vac. Filter 3'x1'.

Girdler S/S Votator # 41 S.

2 Cornell Versators, Type 316 S/S.

Stainless Centrifugals 30" to 60".

Stainless Reactors up to 2000 Gal.

2 Sharples S/S Super-D-Canters.

Whitlock S/S Reflux Cond. 813 sq. ft.

Buflovak S/S Thermo Recompression, Sanitary Evaporator with accessories.

Send for FIRST FACTS, complete lists.

FIRST MACHINERY CORP.
209-289 TENTH ST.
BROOKLYN 15, N. Y.
STerling 8-4672

WATER FILTRATION SYSTEM in first class condition for sale. 1800 gpm diatomaceous earth water filter and carbon purifier system including all auxiliary appurtenances. Units available for immediate shipment. Purchased new in 1958 — used one year. Original cost $66,500.00. Bids solicited.

Reply to: CL 1111 Chemical Processing 111 E. Delaware Pl., Chicago 11, Ill.

a new service of
CHEMICAL PROCESSING
magazine

ADVERTISERS in this Issue

A

Abbé Inc., Paul O. 119
Aeroquip Corporation 175
Aerovent Fan Co. 37
Air Preheater Corporation, The 51
Airslide and Dry-Flo Car Division, General American Transportation Corporation 144
Ajax Flexible Coupling Co., Inc. 185
Allen-Sherman-Hoff Company, The 143
Allied Chemical Corp., Baker & Adamson, General Chemical Division 2nd Cover
Allied Chemical Corp., General Chemical Division 69
Allied Chemical Corporation, National Aniline Division 81
Allied Metal Hose Co. 199
Allis-Chalmers, Engine Material Handling Division 140
Alloy Products Corp. 87
Alloy Steel Products Co., Inc. 8
Alpha-Molykote Corporation, The 188
Aluminum Company of America 152-153
Amercoat Corporation, A Subsidiary of American Pipe & Construction Company ..... 4th Cover
American Chain & Cable, Helicoid Gage Division 202
American Hard Rubber Company, Division of Amerace Corporation 12
American Meter Company, Pump Division 116
American Steel & Wire Division, United States Steel Corporation 156-157
Ampco Metal, Inc. 148
Annin Company, The 167
Appleton Electric Company ..... 3rd Cover
Armstrong Machine Works 163
Association of Industrial Advertisers 150
Automatic Transportation Company, Division of the Yale & Towne Manufacturing Company 147

B

B-I-F Industries 85
B/W Controller Corporation, The 114
Babcock & Wilcox Company, The, Refractories Division 182
Bacharach Industrial Instrument 194
Baker & Adamson, General Chemical Division, Allied Chemical Corporation ..... 2nd Cover
Barnebey-Cheney 83
Bartlett & Snow Co., The, Materials Handling and Processing Division 27
Bean, John, Division of Food Machinery & Chemical Corp. 174
Binks Manufacturing Co. 120
Brabender Instruments, Inc., C. W. 197
Bristol Company, The 86
Brooks Instrument Company, Inc. 104

C

Cambridge Instrument Company Inc. 96
Cambridge Wire Cloth Co., The 177
Carborundum, Refractories Division 173
Cardox, Division of Chemetron Corporation 74
Carlson Inc., G. O. 164
Ceilcote Company, Inc., The 197
Chemical Construction Corporation, Gas Scrubber Division 76
Chemical & Power Products, Inc. 160
Chempump Division, Fostoria Corporation 176
Chicago Pneumatic 52-53
Cleveland Wire Cloth & Mfg. Co., The 160
Coddington Mfg. Co., E. D. 194
Columbia-Geneva Steel Division, United States Steel Corporation 156-157
Combustion Engineering, Inc., Raymond Division 122
Commercial Solvents Corporation 77
Cooper Alloy Corporation 62
Coppus Engineering Corp. 194
Crane Packing Company 6
Croll-Reynolds Co., Inc. 162

D

Daffin Manufacturing Co., Division of Daffin Corporation 120
Darling Valve & Manufacturing Co. 175
Davenport Machine and Foundry Company 98
Dawe's Laboratories, Inc. 82
Delavan Manufacturing Company 90
Detecto Scales, Inc. 136
Dietert Co., Harry W. 74
Dodge Manufacturing Corporation .. 178-179
Doré Co., John L. 41
Dorr-Oliver Incorporated 97
Dow Corning Corporation 10
Ducon Company, Inc., The 180

E

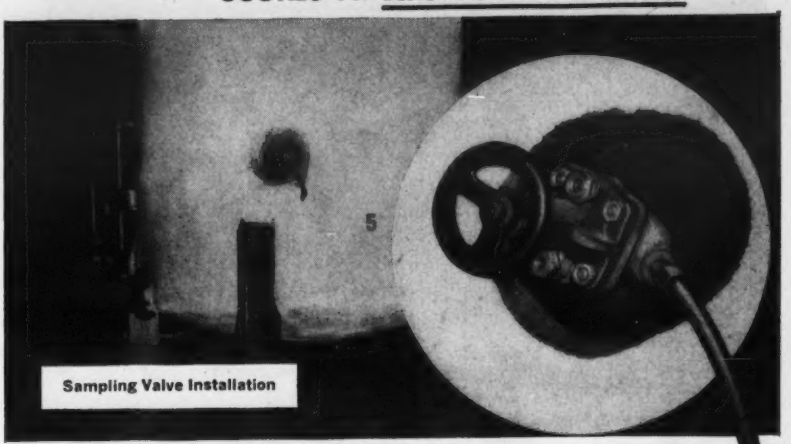
Eastern Industries, Inc., Mixer Division 168
Eco Engineering Company 23
Electric Steel Foundry Company 26A-B
Elgin Softener Corporation 61
Exact Weight Scale Co., The 108

F

Falcon Manufacturing, The, Div. of The First Machinery Corporation 37
Falls Industries, Inc. 132
Fibercast Company, A Division of Youngstown Sheet and Tube Company 165
Fisher Governor Company 117
Flexrock Company 202
Fluid Energy Processing & Equipment Company 90
Foremost Food and Chemical Company, El Dorado Division 72
Foxboro Company, The 45, 107
Fuller Company, Subsidiary of General American Transportation Corporation 141

Strahman

SCORES AT AMERICAN ALKYD!



Sampling Valve Installation

"Just a note to let you know how satisfied we are with Strahman Sample Valves . . With the original valves . . a residue of resin remained in the valve. The Ram Type Strahman Valves . . overcame this problem; since the ram forces every bit of resin back into the kettle . . not a trace of resin remains in the valve to prevent the flow of succeeding Samples."

Says **FRED GREEN**, *Plant Supt., American Alkyd Industries.*

Write for literature

Strahman VALVES, INC.
Nicolet Ave., Florham Park, N.J.

Drain Valves • Sampling Valves • Spray Nozzles • Mixing Units • Liquid Level Gauges

Check 1529 opposite last page.

Allflex

STAINLESS STEEL "MNH" FLEXIBLE CONNECTORS

WHEREVER RIGID PIPELINE CONNECTIONS MUST BE FLEXIDIZED

VIBRATION DAMPING
MISALIGNMENT COMPENSATION
EXPANSION ABSORPTION
OFFSET INSTALLATIONS
RECIPROCATING MOTION
LOADING LINES

Also available in Bronze and Monel

SAME DAY FACTORY SHIPMENT ON

ALL THESE STOCK SIZES	IN ALL THESE LENGTHS
1/4"	12"
3/8"	18"
1/2"	24"
3/4"	30"
1"	36"
1 1/4"	48"
1 1/2"	60"
2"	72"

LARGER & LONGER SIZES AVAILABLE

ALLIED METAL HOSE CO.
3784 Ninth St.
Long Island City 1, N. Y.
Phone: STillwell 4-5173

ALLIED METAL HOSE CO.
3784 Ninth St.
Long Island City 1, N. Y.

RUSH THE ALLFLEX "MNH" DATALOG TO

NAME _____
TITLE _____
COMPANY _____
ADDRESS _____
CITY _____

CP-1160

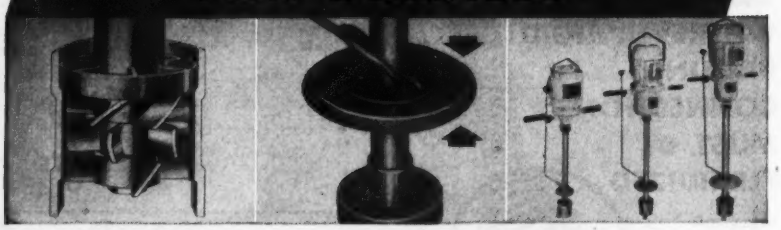
Check 1530 opposite last page.

SHEAR-FLOW

Shear-Flow's high shear action produces finer, faster blending, dispersing and homogenizing. The new Model RL Shear-Flow portable mixer represents a major advance in mixer design. The new Hi-Shear Head consists of two rotating impellers and two stationary stators enclosed in a cylindrical housing. The fine clearance between impellers and stators results in rapid shearing action and a high degree of turbulence, resulting in a more complete reduction of agglomerates within the mixture.

- Greatly reduces mixing time
- Uniform circulation—no vortex
- Emulsifies immiscible liquids
- Controllable flow pattern
- Chemically inert seals
- Handles viscous materials with ease
- No operating torque

HAS A GOOD HEAD FOR BUSINESS



Close tolerances between impellers and stators promotes high shear for reduction and dispersion of material.

Adjustable deflector plate controls flow pattern for desired mixing action and air entrainment.

Three basic portable models for processing 1 to 250 gals. plus continuous mix units for high volume processing.

Write today for complete information on the Shear-Flow line of mixers.

SHEAR-FLOW
GABB SPECIAL PRODUCTS INC.

GABB SPECIAL PRODUCTS INC.
Windsor Locks, Conn.

Check 1531 opposite last page.

G

Gabb Special Products Inc. 200
General American Transportation Corporation, Airslide and Dry-Flo Car Division 144
General American Transportation Corporation, Process Equipment Division, Louisville Dryer Division 92-93
General American Transportation Corporation, Process Equipment Division, Turbo-Mixers 195
General Chemical Division, Allied Chemical Corporation 69
General Electric Company, Silicone Products Dept. 83
Girdler Process Equipment Div., Chemetron Corporation 56
Glas-Col 115
Goodrich Chemical Company, B. F. 28
Goslin-Birmingham Manufacturing Co., Inc. 190
Goulds Pumps, Inc. 169
Gray Company, Inc. 136

H

Hamer Valves 172
Hapman Corporation, Conveyor Division 189
Harrington & King Perforating Co., Inc., The 96
Harrisburg Steel Co., Division of Harsco Corporation 17
Helicoid Gage Division, American Chain & Cable Company, Inc. 202
Hercules Powder Company 75
Hetherington & Berner Inc. 164
Highside Chemicals Incorporated 202
Hilliard Corporation, The 63
Hills-McCanna Company 13
Hooker Chemical Corporation .. 22, 70, 79
Hough Co., The Frank G., Subsidiary of International Harvester Company .. 137

I

Illinois Water Treatment Co. 100
Independent Engineering Co., Inc. 98
International Nickel Company, Inc., The 47, 161, 193
International Process Equipment Company Division, The Patterson Foundry and Machine Company 57

J

Jamesbury Corp. 170
Jenkins Bros. 5
Johnson Corporation, The 184
Jomac Incorporated 175
Jones & Laughlin Steel Corporation, Container Division 159

K

Kano Laboratories 96
Kieley & Mueller, Incorporated 99
Knox Porcelain Corporation 160
Koppers Company, Inc., Aeromaster Fans Dept. 172
Koppers Company, Inc. 37, 181

L

LaBour Company, Inc., The 20
Lammert & Mann Co., Inc. 184
Lapp Insulator Co. Inc., Process Equipment Division 149
Lee Metal Products, Inc. 121
Link-Belt Company 135
Louisville Dryers, General American Transportation Corporation, Process Equipment Division 92-93
Lucidol Division, Wallace & Tiernan Incorporated 1
Ludlow-Saylor Wire Cloth Company 1
Lunkenheimer Company, The 1

M

Majac, Inc. 1
Manning, Maxwell & Moore, Inc., Gauge and Instrument Division 1
Manton Gaulin Manufacturing Co., Inc. 1
Manzel, A Unit of Houdaille Industries, Inc. 1
Marsh Instrument Company, Division of Colorado Oil and Gas Corporation .. 1
Martin Engineering Company 1
Mason-Neilan, Division of Worthington Corporation 112-1
Mathieson Chemicals 1
Mechanical Products Corporation 1
Milton Roy Company 1
Mine Safety Appliances Company, Instrument Division 1
Minnesota Mining and Manufacturing Company 18-1
Morehouse-Cowles, Inc. 1
Multi-Metal Wire Cloth Co., Inc. 1

N

Nalco Chemical Company 7
National Aniline Division, Allied Chemical Corporation 8
National Distillers and Chemical Corporation, U. S. Industrial Chemicals Co. Division 86A-1
National Drying Machinery Company, The 12
National Engineering Company, Simpson Mix-Muller Division 12
National Filter Media Corporation, The 1
National Tube Division, United States Steel Corporation 156-15
Neptune Meter Company, Liquid Meter Division 10
Niagara Blower Company 9
North American Car Corporation 3

O

Olin Mathieson, Chemicals Division 7
Orr & Sembower, Inc. 3

P

Palmer Thermometers, Inc. 11
Penberthy Manufacturing Company, Division of Buffalo-Eclipse Corporation 11
Pennsylvania Fluorocarbon Co., Inc. .. 16
Pennsylvania Pump and Compressor Company 16
Philadelphia Gear Corporation 4
Pittsburgh Chemical Company 1
Pittsburgh Lectrodryer Division, McGraw-Edison Company 19
Potts Company, Horace T., Speedline Fittings Division 6
Powell Company, The Wm. 6
Powell Pressed Steel Company, The .. 13
Prater Pulverizer Company 18
Pressed Steel Tank Company 19
Propellair, Div. of Robbins & Myers, Inc. 9
Protective Lining Corporation 19
Protectoseal Company, The 11
Pulverizing Machinery Company, A Division of American-Marietta Company 2
Putman Publishing Company 183, 188, 19 19

R

Raybestos-Manhattan, Inc., Manhattan Rubber Division 3
Raybestos-Manhattan, Inc., Plastic Products Division 20

Raymond Bag Corporation, A Division of Albermarle Paper Mfg. Co. 142
Raymond Division, Combustion Engineering, Inc. 122
Reilly Tar & Chemical Corp. 68
Renneburg & Sons Co., Edw. 101
Resistoflex Corporation 155
Robbins & Myers, Inc. 95
Rockwell Co., W. S. 101, 120
Rohm & Haas Company 71, 84

S

Sandvik Steel, Inc., Steel Belt Conveyor Department 146
Sarco Company, Inc. 126
Sargent's Sons Corporation, C. G. 130
Scam Instrument Corp. 114
Sharples Corporation, The 128
Shriver & Co., Inc., T. 97
Sigmamotor Inc. 184
Simpson Company, The Orville 124
Simpson Mix-Muller Division, National Engineering Company 125
Sindar Corporation 74
Snap-Tite 151
Sonneborn Chemical and Refining Corporation, White Oil Division 80
Southwestern Engineering Company 118
Sparkler Manufacturing Company 131
Speedline Fittings Division, Horace T. Potts Company 7
Spray Engineering Company 196
Spraying Systems Co. 184
Sprout-Waldron 121
Square D Company, EC&M Division 11
Standard Oil Company (Indiana) 187
Strahman Valves, Inc. 199
Sturtevant Co., P. A. 174
Sturtevant Mill Co. 130
Sun Shipbuilding & Dry Dock Company 89
Swartwout Division, Crane Co. 85
Swenson Evaporator Company Division, Whiting Corporation 16

T

Tamms Industries Co. 82
Taylor Instrument Companies 58-59
Technical Sales Corporation 48
Tennessee Coal & Iron Division, United States Steel Corporation 156-157
Thermo Electric Co., Inc. 105
Thermovac, Inc., A Subsidiary of Rheem Manufacturing Co. 65
Toledo Scale, Division of Toledo Scale Corporation 186
Towmotor Corporation 145
Tranter Mfg., Inc. 198
Traylor Engineering & Manufacturing Division of Fuller Company 127
Turbo-Mixers, General American Transportation Corporation, Process Equipment Division 195
Tyler Company, The W. S. 55

U

Union Carbide Corporation, Silicones Division 183
U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation 86A-B
U. S. Stoneware Co. 138
United States Rubber, Transportation Products Dept. 154
United States Steel Corporation 156-157
United States Steel Export Company, United States Steel Corporation 156-157
United States Steel Supply Division, United States Steel Corporation 156-157
Universal Road Machinery Co., Rubert M. Gay Division 164

V

Vanton Pump & Equipment Corp., Division of Cooper Alloy Corporation 189, 198
Vapor Recovery Systems Company, The 50
Vibra-Screw Feeders, Inc. 26
Victaulic Company of America 87
Viking Pump Company 183
Vogt Machine Co., Henry 15

W

Weighing & Controls, Inc., Div. of CompuDyne Corp. 181
Well Equipment Mfg. Corp., Division of Chiksan Company 172
Whiting Corporation, Swenson Evaporator Company Division 16
Wiegand Company, Edwin L. 123
Worcester Valve Co., Inc. 158

Y

Youngstown Sheet & Tube Company 165

Advertising Representatives

CHARLES P. GILKISON, JR.
Advertising Director — West

NORMAN A. SCHUELE, JR.
Advertising Director — East

BUFFALO 15, 1931 Kensington Avenue, Windsor 7765, Raymond C. Clifford, *District Manager*

CHICAGO 11, 111 East Delaware Place, WHitehall 4-6141, George W. McFedries, *District Manager;* Vincent F. Donohue, *District Manager;* Philip T. Clark, *District Manager*

CLEVELAND 9, 5414 Archmere Avenue, SHadyside 1-9452

HOUSTON 6, 1310 Hawthorne, P.O. Box 66393, Jackson 9-1431, The Media Company, Calvin Clausel

LOS ANGELES 57, Granada Building, 672 So. La Fayette Park Place, DUnkirk 8-2286, Wettstein, Nowell & Johnson, Inc., Bob Wettstein, Jerry Holtz

NEW ENGLAND, East Shore Rd., Jamestown, R. I., Ph. Jamestown 38, Kenneth S. Kaull, *Vice President*

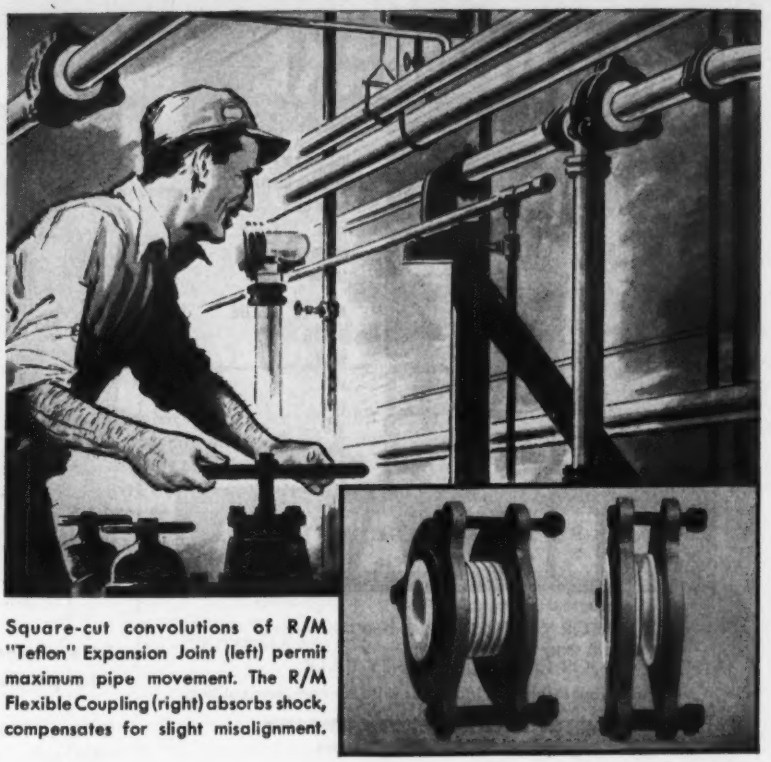
NEW YORK 17, 369 Lexington Avenue, MUrray Hill 6-7738, Henry C. Ruppel, *District Manager;* Robert A. Norton, *District Manager;* Stanley B. Cressey, *District Manager;* John M. Sheehan, Jr., *District Manager*

PITTSBURGH 22, 1300 Clark Building, ATlantic 1-2783, Raymond C. Clifford, *District Manager*

PORTLAND 5, 337 Pittock Block, 921 S. W. Washington Street, CApitol 8-4107, Wettstein, Nowell & Johnson, Inc.

SAN FRANCISCO 3, 417 Market Street, YUkon 2-9537, Wettstein, Nowell & Johnson, Inc., Jerry Nowell, Gene R. Watts

SOUTHEASTERN STATES, 40 Peachtree Place, N. W., Atlanta 9, Ga. TRinity 2-2235, Joe H. Howell



Square-cut convolutions of R/M "Teflon" Expansion Joint (left) permit maximum pipe movement. The R/M Flexible Coupling (right) absorbs shock, compensates for slight misalignment.

Best way to beat ✓expansion ✓vibration ✓misalignment of corrosion-resistant piping:

R/M "TEFLON" EXPANSION JOINTS AND COUPLINGS

Wherever you use glass, plastic or other corrosion-resistant piping, you need R/M "Teflon"* Expansion Joints and Flexible Couplings to take the brunt of surge, expansion and contraction, vibration and misalignment.

R/M "Teflon" Couplings and Expansion Joints are made from a single piece of "Teflon" in standard pipe sizes from 1 to 12 in. They are fitted with cast-iron flanges to ASME and Corning drill patterns. R/M Expansion Joints are designed for pressures from 20 to 85 psi, according to sizes and operating temperatures.

High-pressure expansion joints, step-down couplings, and other special configurations are also available. Send your problems in "Teflon" to R/M—first in *complete "Teflon" service.* Call the nearest office listed below or write Plastic Products Division, Raybestos-Manhattan, Inc., Manheim, Pa.

*Du Pont TM for its TFE-fluorocarbon resins

R/M

PLASTIC PRODUCTS DIVISION
RAYBESTOS-MANHATTAN, INC.
Manheim, Pa.

BIRMINGHAM 1 • CHICAGO 31 • CLEVELAND 16 • DALLAS 26 • DENVER 16 • DETROIT 2
HOUSTON 1 • LOS ANGELES 58 • MINNEAPOLIS 16 • NEW ORLEANS 17 • PASSAIC • PHILADELPHIA 3
PITTSBURGH 22 • SOUTH SAN FRANCISCO 5 • SEATTLE 4 • PETERBOROUGH, ONTARIO, CANADA

SPECIALISTS IN ASBESTOS, RUBBER, ENGINEERED PLASTICS, SINTERED METAL

Check 1532 opposite last page.

FOR THE **BIG SHAKE***

"World's Quietest Vibrators"

hopper cars
massive bunkers
large bins
silos
chutes
shake-outs

MOVES, FEEDS, SIFTS
sand
clay
coal
ore
other materials

VIBROLATOR®

VIBRATION INDUCERS

*VIBROLATOR CCVP-3000, the 6600-lb. impact vibrator — or one of its three smaller brothers — IS GUARANTEED TO DO YOUR JOB OR YOUR MONEY BACK.

Order from your distributor today, or write for complete catalog.

MARTIN ENGINEERING COMPANY
Largest Producer of Rotary Vibrators
155 Kemp Street, Neponset, Illinois

® VIBROLATOR is Martin Engineering's registered trade mark for vibration inducers and vibrator accessories.

Check 1533 opposite last page.

REPAIR FACTORY FLOORS

WITH THIS...

INSTANT SETTING PATCH!

Repair broken factory floors without usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut—tamp smooth—truck over! No waiting! INSTANT-USE bonds tight to old concrete—right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

MAIL COUPON FOR FREE BROCHURE

INSTANT-USE

FLEXROCK COMPANY (Offices in principal cities)
3611 Filbert St., Philadelphia 1, Pa.

Please send me complete INSTANT-USE information, and Free INSTANT-USE BROCHURE—no obligation. (Clip and attach Coupon to company letterhead).

Name .....
Title .....
Company .....
Address .....

Check 1534 opposite last page.

THAT'S INTERESTING

Safe water supply certain with pocket-size filter

Even a rain puddle can provide safe, clean, sweet-smelling water by using a unique pocket-size filtering device, introduced by Sure Pure Company, Inc.

Weighing 15 oz, filter unit consists of a filter pad between two fiber screens. Water is siphoned through filter by compressing a rubber bulb connected to filter by rubber tubing.

Filter element consists of asbestos fibers specially refined, molecularly charged and treated with admixture of insoluble particles (both negative and positive) which attract bacteria, virus, coli, dirt, etc. Chemicals in filter neutralize the harmful elements.

Prototype for undersea filling stations tested

A 1,200-barrel (50,000 gal) envelope-shaped container, submerged in 52′ of water off the Louisiana coast, is currently undergoing tests to determine whether it will be the prototype for future navy fueling stations.

Developed by United States Rubber Co., the container measures 22′ by 70′ empty, and 20 x 68 x 6′ filled. It is reinforced by 6,160 sq ft of

LEAK-PROOF with Leak Lock®

SPECIFIED IN HUNDREDS OF APPLICATIONS... WORKS WHERE OTHER COMPOUNDS FAIL

Don't take chances—seal all joints, flanged or threaded with Leak Lock—won't contaminate—contains no lead—withstands solvent action—*excellent adhesion.*

Leak Lock won't freeze joints or heat spontaneously—remains unaffected by shock or vibration. Keeps mating surfaces corrosion free.

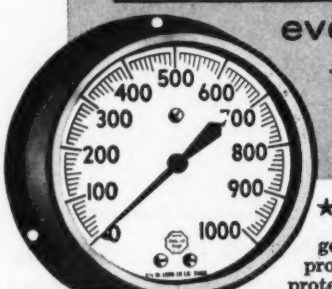
Sold in 4-oz. applicator cans, 1⅓ oz. squeeze tubes—pint and 10-lb. containers. Write today for: ***FREE SAMPLE TUBE***

Listed by Underwriters' Laboratories for gas, oil, propane and butane equipment.

HIGHSIDE CHEMICALS INCORPORATED
16 Colfax Avenue • Clifton, N. J.

Check 1535 opposite last page.

Helicoid Gages give ***Sustained Accuracy,*** even on the toughest jobs



★ Exclusive Helicoid movement has no gears, no teeth. Shockproof construction protects accuracy through millions of cycles.
★ Bourdon tubes available in four materials—bronze, steel, stainless steel, and K Monel—won't stretch, crack, or leak.
★ Six cases, including new solid-front safety case, meet every mounting requirement.
★ External pointer adjustment can't be jarred out of position.
★ A complete selection of gages and accessories for hydraulic, chemical, and other service.

Write for Catalog DH-65.

HELICOID GAGES
Helicoid Gage Division
American Chain & Cable Company, Inc.
929-P Connecticut Avenue • Bridgeport 2, Conn.

Check 1536 opposite last page.

If you want more information on processes, materials, controls, or other developments discussed herein, as you read this issue, ask our READER SERVICE DEPARTMENT . . . use this sheet

READER SERVICE SLIP
An Editorial Service — No Obligation

As you read editorial articles and advertisements which interest you, on which you'd like more information, note key number under each. Check that number in space provided on this sheet. Fill in your name, title, company, main product, and address on reverse side and mail to publisher's Reader Service Dept. Information will come to you direct, without obligation.

IMPORTANT: If you check a number having an asterisk (*) after it, be sure to follow special instructions at bottom of this page.

NOVEMBER 1960

☐ 1000*	☐ 1043	☐ 1086	☐ 1129*	☐ 1172	☐ 1215
☐ 1001	☐ 1044	☐ 1087	☐ 1130	☐ 1173	☐ 1216
☐ 1002	☐ 1045	☐ 1088	☐ 1131	☐ 1174	☐ 1217
☐ 1003	☐ 1046	☐ 1089	☐ 1132	☐ 1175	☐ 1218
☐ 1004	☐ 1047	☐ 1090	☐ 1133	☐ 1176	☐ 1219
☐ 1005	☐ 1048	☐ 1091	☐ 1134	☐ 1177	☐ 1220
☐ 1006	☐ 1049	☐ 1092	☐ 1135	☐ 1178	☐ 1221
☐ 1007	☐ 1050	☐ 1093	☐ 1136	☐ 1179	☐ 1222
☐ 1008*	☐ 1051	☐ 1094*	☐ 1137	☐ 1180	☐ 1223
☐ 1009	☐ 1052	☐ 1095	☐ 1138	☐ 1181	☐ 1224
☐ 1010	☐ 1053	☐ 1096*	☐ 1139	☐ 1182*	☐ 1225
☐ 1011	☐ 1054	☐ 1097	☐ 1140	☐ 1183*	☐ 1226
☐ 1012	☐ 1055	☐ 1098	☐ 1141	☐ 1184	☐ 1227
☐ 1013	☐ 1056	☐ 1099*	☐ 1142	☐ 1185	☐ 1228
☐ 1014	☐ 1057	☐ 1100	☐ 1143*	☐ 1186	☐ 1229
☐ 1015	☐ 1058*	☐ 1101	☐ 1144	☐ 1187	☐ 1230
☐ 1016	☐ 1059	☐ 1102	☐ 1145	☐ 1188	☐ 1231
☐ 1017	☐ 1060	☐ 1103	☐ 1146	☐ 1189	☐ 1232
☐ 1018	☐ 1061*	☐ 1104	☐ 1147	☐ 1190	☐ 1233
☐ 1019	☐ 1062	☐ 1105	☐ 1148	☐ 1191	☐ 1234
☐ 1020	☐ 1063	☐ 1106	☐ 1149	☐ 1192	☐ 1235
☐ 1021*	☐ 1064	☐ 1107	☐ 1150	☐ 1193	☐ 1236
☐ 1022	☐ 1065	☐ 1108	☐ 1151	☐ 1194	☐ 1237
☐ 1023	☐ 1066	☐ 1109	☐ 1152	☐ 1195	☐ 1238
☐ 1024	☐ 1067	☐ 1110	☐ 1153	☐ 1196	☐ 1239
☐ 1025	☐ 1068	☐ 1111	☐ 1154	☐ 1197	☐ 1240
☐ 1026	☐ 1069	☐ 1112	☐ 1155	☐ 1198	☐ 1241
☐ 1027	☐ 1070	☐ 1113	☐ 1156	☐ 1199*	☐ 1242
☐ 1028	☐ 1071	☐ 1114	☐ 1157*	☐ 1200	☐ 1243
☐ 1029	☐ 1072	☐ 1115	☐ 1158	☐ 1201*	☐ 1244
☐ 1030	☐ 1073	☐ 1116	☐ 1159	☐ 1202	☐ 1245
☐ 1031	☐ 1074	☐ 1117	☐ 1160	☐ 1203	☐ 1246
☐ 1032	☐ 1075	☐ 1118	☐ 1161	☐ 1204	☐ 1247
☐ 1033	☐ 1076	☐ 1119	☐ 1162	☐ 1205	☐ 1248
☐ 1034*	☐ 1077*	☐ 1120	☐ 1163	☐ 1206	☐ 1249
☐ 1035	☐ 1078	☐ 1121	☐ 1164	☐ 1207*	☐ 1250
☐ 1036	☐ 1079	☐ 1122	☐ 1165	☐ 1208	☐ 1251
☐ 1037	☐ 1080	☐ 1123	☐ 1166	☐ 1209	☐ 1252
☐ 1038	☐ 1081	☐ 1124	☐ 1167	☐ 1210	☐ 1253
☐ 1039	☐ 1082	☐ 1125*	☐ 1168	☐ 1211	☐ 1254
☐ 1040	☐ 1083*	☐ 1126	☐ 1169	☐ 1212	☐ 1255
☐ 1041	☐ 1084*	☐ 1127*	☐ 1170	☐ 1213	☐ 1256
☐ 1042	☐ 1085	☐ 1128	☐ 1171	☐ 1214*	☐ 1257

Use this space for writing in specific literature or product designation when you check a number with an asterisk (*) in accompanying list. Repeat the key number from that list, and follow it with specific bulletin number (or title), or product name, as it appears in article or advertisement. PLEASE TYPE OR PRINT.

Key No.	Description

READER SERVICE SLIP Continued from reverse side of this sheet **NOVEMBER 1960**

☐ 1258	☐ 1304	☐ 1350	☐ 1396	☐ 1442	☐ 1492
☐ 1259	☐ 1305	☐ 1351	☐ 1397	☐ 1443	☐ 1493
☐ 1260	☐ 1306	☐ 1352	☐ 1398	☐ 1444	☐ 1494
☐ 1261	☐ 1307	☐ 1353	☐ 1399	☐ 1445	☐ 1495
☐ 1262	☐ 1308	☐ 1354	☐ 1400	☐ 1446	☐ 1496
☐ 1263	☐ 1309	☐ 1355	☐ 1401	☐ 1448	☐ 1497
☐ 1264	☐ 1310	☐ 1356	☐ 1402	☐ 1449	☐ 1498
☐ 1265	☐ 1311	☐ 1357	☐ 1403	☐ 1450	☐ 1499
☐ 1266	☐ 1312	☐ 1358	☐ 1404	☐ 1451	☐ 1500
☐ 1267	☐ 1313	☐ 1359	☐ 1405	☐ 1452*	☐ 1501
☐ 1268	☐ 1314	☐ 1360	☐ 1406	☐ 1453	☐ 1502
☐ 1269	☐ 1315	☐ 1361	☐ 1407	☐ 1454	☐ 1503
☐ 1270	☐ 1316	☐ 1362	☐ 1408	☐ 1455	☐ 1504
☐ 1271	☐ 1317	☐ 1363	☐ 1409	☐ 1456*	☐ 1505
☐ 1272	☐ 1318*	☐ 1364	☐ 1410	☐ 1457	☐ 1506
☐ 1273	☐ 1319	☐ 1365	☐ 1411	☐ 1458	☐ 1507
☐ 1274	☐ 1320	☐ 1366	☐ 1412	☐ 1459	☐ 1508
☐ 1275	☐ 1321	☐ 1367	☐ 1413	☐ 1460	☐ 1509
☐ 1276	☐ 1322	☐ 1368*	☐ 1414	☐ 1461	☐ 1510
☐ 1277	☐ 1323*	☐ 1369	☐ 1415	☐ 1462	☐ 1511
☐ 1278	☐ 1324	☐ 1370	☐ 1416	☐ 1463	☐ 1512
☐ 1279	☐ 1325*	☐ 1371	☐ 1417	☐ 1464	☐ 1513
☐ 1280	☐ 1326	☐ 1372*	☐ 1418	☐ 1465*	☐ 1514
☐ 1281	☐ 1327	☐ 1373	☐ 1419	☐ 1466	☐ 1515
☐ 1282*	☐ 1328	☐ 1374	☐ 1420	☐ 1467	☐ 1516
☐ 1283	☐ 1329	☐ 1375	☐ 1421	☐ 1468	☐ 1517
☐ 1284	☐ 1330	☐ 1376	☐ 1422	☐ 1469	☐ 1518
☐ 1285	☐ 1331	☐ 1377	☐ 1423	☐ 1470	☐ 1519
☐ 1286	☐ 1332	☐ 1378	☐ 1424	☐ 1471	☐ 1520
☐ 1287	☐ 1333	☐ 1379*	☐ 1425	☐ 1472*	☐ 1521
☐ 1288	☐ 1334	☐ 1380	☐ 1426	☐ 1473	☐ 1522
☐ 1289	☐ 1335*	☐ 1381	☐ 1427	☐ 1474	☐ 1523
☐ 1290	☐ 1336	☐ 1382	☐ 1428	☐ 1475	☐ 1524
☐ 1291	☐ 1337	☐ 1383*	☐ 1429	☐ 1476	☐ 1525
☐ 1292	☐ 1338	☐ 1384	☐ 1430	☐ 1477	☐ 1526
☐ 1293	☐ 1339	☐ 1385	☐ 1431	☐ 1478	☐ 1527
☐ 1294	☐ 1340	☐ 1386	☐ 1432	☐ 1479	☐ 1528
☐ 1295	☐ 1341	☐ 1387	☐ 1433	☐ 1480	☐ 1529
☐ 1296	☐ 1342	☐ 1388	☐ 1434	☐ 1481	☐ 1530*
☐ 1297	☐ 1343	☐ 1389	☐ 1435	☐ 1482	☐ 1531
☐ 1298	☐ 1344	☐ 1390	☐ 1436	☐ 1483	☐ 1532
☐ 1299	☐ 1345	☐ 1391	☐ 1437	☐ 1484	☐ 1533
☐ 1300	☐ 1346	☐ 1392	☐ 1438	☐ 1485	☐ 1534
☐ 1301	☐ 1347	☐ 1393	☐ 1439*	☐ 1486	☐ 1535
☐ 1302	☐ 1348	☐ 1394	☐ 1440	☐ 1487	☐ 1536
☐ 1303	☐ 1349	☐ 1395	☐ 1441	☐ 1488	☐ 1537
				☐ 1489	☐ 1538
				☐ 1490	
				☐ 1491	

Be Sure To Give Your Address

*On all numbers having an asterisk (*) after them, please identify the exact product or piece of literature in one of the blank columns on this and front page. Write in the key number, as given on the slip, followed by the bulletin number (or title), or name of product in which you are interested.

(This request form expires February 5, 1961)

Use this space for writing in specific literature or product designation when you check a number with an asterisk (*) in accompanying list. Repeat the key number from that list, and follow it with specific bulletin number (or title), or product name, as it appears in article or advertisement. PLEASE TYPE OR PRINT.

Key No.	Description

Please type or print and be sure to give your title and main product of company

Name ..... Title .....

Company ..... Main Product .....

Street Address of Company .....

City ..... Zone No. ..... State .....

This is an Editorial Service — No Obligation

Fill in . . . mail to READER SERVICE DEPT., CHEMICAL PROCESSING
111 East Delaware Place, Chicago 11, Illinois

Special subscription request-qualification form for use of **NOVEMBER 1960**

Management and technical men who wish to receive CHEMICAL PROCESSING regularly — request below . . . if you qualify, there is no charge

If you are responsible for processing operations, in a management or technical capacity, as corporate officer, manager, technical purchasing agent, chemical engineer, chemist, engineer, or equivalent responsibility... in a plant of substantial operations* where chemical processing is an important factor . . . CHEMICAL PROCESSING will be sent to you regularly, at your request — there is no charge.

Present Reader . . . if this issue of CHEMICAL PROCESSING was addressed to you or if you have previously mailed one of these request slips, it is not necessary to fill in this form.

New Reader . . . if you qualify as outlined above CHEMICAL PROCESSING will be sent to you regularly. There is no charge to those who qualify. In requesting, be sure to answer all questions. If your firm is not rated or listed in standard references, indicate size of the company by capacity, annual sales or number of employees. Unless all information is given, magazine will not be sent.

Please print or type

Name ..... Title .....

Company .....

Main Products .....

Rating of Company .....

Street Address of Company .....

City ..... Zone No. ..... State .....

* "substantial operations" does not necessarily mean an extremely large plant. But requests for the magazine exceed supply so we must set standards to insure publication being sent where it can be used to best advantage.

Others in Your Plant . . . if others in your plant, having responsibilities for processing operations as outlined above, would also like to receive CHEMICAL PROCESSING, use the form on back of this sheet.

Change of Address . . . Use this form to notify us of a change in address. Please answer all questions in regard to your new affiliation, and in addition give us your former address including company, city and state.

Please print or type

Former Company Affiliation .....

Former Address .....

Your Name ..... Present Title .....

Present Company .....

Main Products .....

Rating of Company .....

Street Address of Company .....

City ..... Zone No. ..... State .....

Just mail this request to
READER SERVICE DEPT., CHEMICAL PROCESSING
111 East Delaware Place, Chicago 11, Illinois

See other side of this sheet

WOULD OTHERS IN YOUR PLANT also like to receive CHEMICAL PROCESSING without charge?

If others in your plant also would like to receive CHEMICAL PROCESSING . . . and if they qualify as outlined on the reverse side of this sheet . . . list their names below. Then mail this slip to READER SERVICE DEPT., CHEMICAL PROCESSING, 111 East Delaware Place, Chicago 11, Illinois.

Please print or type

Name _____ Title _____

Name _____ Title _____

Name _____ Title _____

Name _____ Title _____

Company _____

Main Products _____

Rating of Company _____

Street Address of Company _____

City _____ Zone No. _____ State _____

IF YOU ALSO WOULD LIKE

to receive CHEMICAL PROCESSING personally

see reverse side of this sheet. There is no charge if you qualify.

See other side of this sheet

wo-ply nylon.

The container is anchored to the ocean floor by 300 yds of two-ply nylon webbing attached to an 80 by 33′ tubular steel frame.

By using several containers interconnected to a common header, million-gallon caches would be possible.

Sugar, spice, everything nice to go up in smoke

Instead of just asking whether you want your favorite brand in pack or flip-top box, clerks may some day be inquiring, "What flavor do you want?"

According to the *New York World Telegram*, tobacco processors' chemists are ready to produce cigarets with such flavors as chocolate, cinnamon, anise, brandy, cloves, ginger and cocoa.

All they're waiting for is the green light from you.

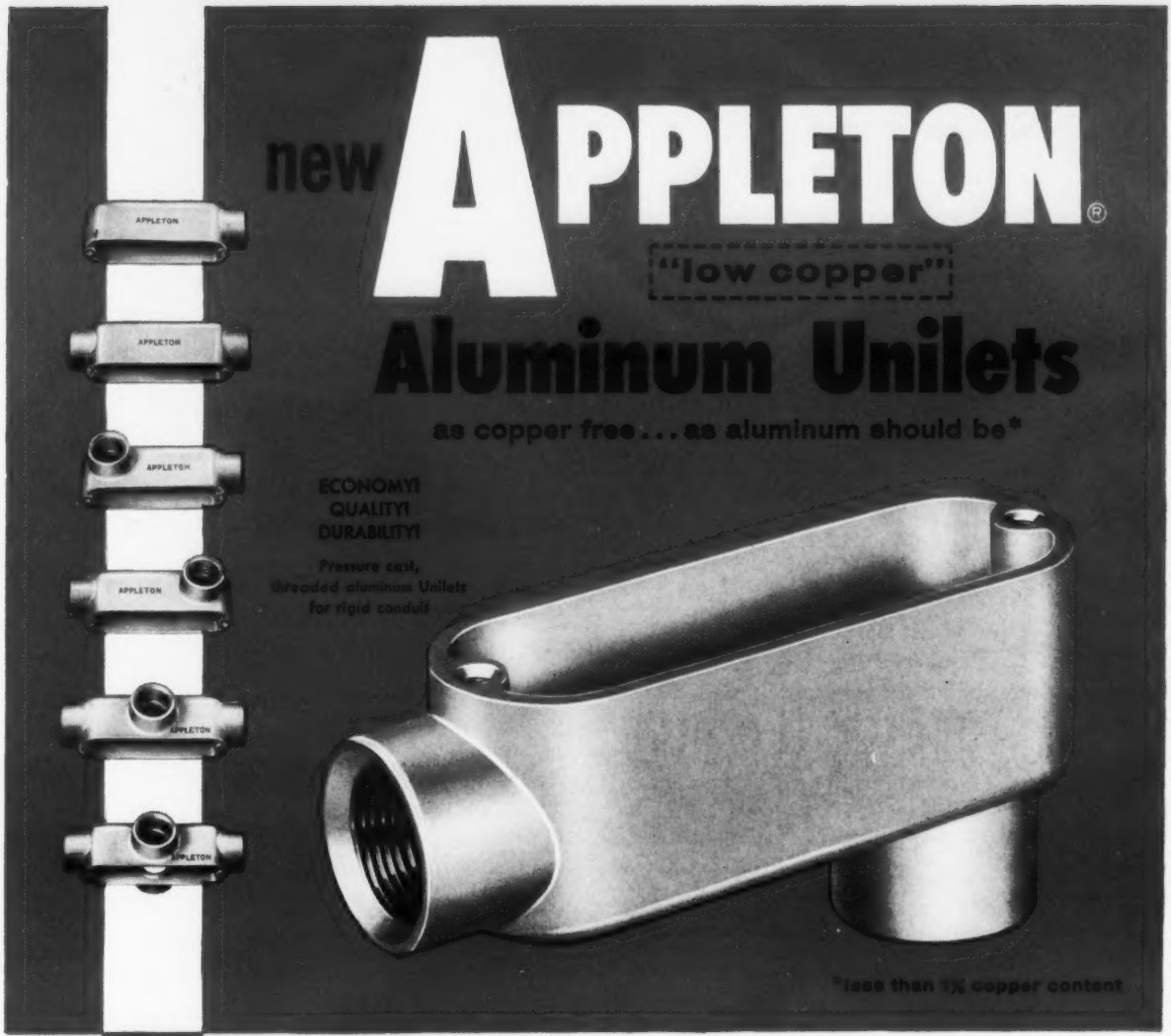
Mechanical scarecrow clears plant of birds

Refineries and chemical plants whose housekeeping problem are complicated by pigeons and other birds which consider pipe and towers perfect roosts, may be interested in a mechanical scarecrow. Three ft long and portable, unit can be set by timer to fire explosive bursts every four to five minutes during certain periods of the day.

Acetylene gas is fed into combustion chamber behind horn-shaped barrel. Valve regulates flow of gas and can be adjusted to determine firing interval. Flowing gas drives a piston which cocks the flint-and-wheel firing mechanism.

When enough gas accumulates it is released into combustion chamber and spark is struck, making small but loud explosion.

Called Zon Automatic Scarecrow, unit is marketed in this country by B. M. Lawrence and Company, 244 California St., San Francisco 11, Calif.



Form 85 Unilets

The advantages of aluminum combined with Appleton manufacturing standards for dependable performance now make available a wide selection of rugged, serviceable pressure cast aluminum fittings to give you easier electrical installations . . . faster, more economical!

Your distributor has them now. The complete line includes seven of the most popular types in ½", ¾" and 1" sizes to meet most job requirements. When you use them, you will agree . . . they are outstanding in every respect—from design to manufacturing excellence.

BEFORE YOU BUY OR SPECIFY . . . CHECK THESE APPLETON QUALITY FEATURES

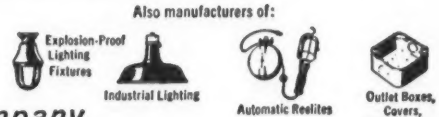
Easy to use—roomy • Lightweight—durable • Taper Tapped threading • Precision hub alignment • Chamfered hub edges • Pressure cast smoothness • Reinforced points of stress • Easy-to-read cast identification • Attractive, practical design • Low cost—high quality • Wide assortment of covers available.

Contact your distributor or write for bulletin No. AL 60. It includes details for the entire *aluminum* product line by Appleton: Form 85 and larger sizes in Form 35 Unilets, FS and JB fittings and V-51 lighting fixtures.

Sold through franchised distributors only

APPLETON electric company

Also manufacturers of:

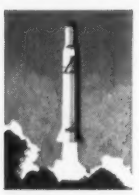


1701 Wellington Avenue, Chicago 13, Illinois

Check 1537 opposite last page.

BONDSTRAND®

An imaginative solution to your piping problems



From Missile Research...

A new product for process piping

- Twice as strong as steel
- 1/4 the weight of steel
- Inherently resistant to chemicals which attack stainless steel

Bondstrand is a corrosion-resistant, high strength, rigid pipe made of glass filaments bonded in chemically inert synthetic resins. It is capable of withstanding high pressure and the corrosive attack of many salt, acid, and alkaline solutions. The outside surface is equally resistant because the pipe is made entirely of corrosion-proof materials. No painting or maintenance is necessary.

Bondstrand's light weight and ease of assembly can save up to 50% of installation costs. Actual cost records of typical applications prove that the total installed cost averaged only 1.3 times that of carbon steel pipe. By eliminating the corrosion problem and down time for replacement or repair, Bondstrand saves many times its slightly higher initial cost.

Bondstrand is now available in sizes from 2" through 8" with all necessary couplings and fittings. Larger sizes available on special order.

Write for bulletin containing complete data, including physical properties, chemical resistance, flow rates, and other design information.

Amercoat® CORPORATION 125

A Subsidiary of American Pipe and Construction Co.

Dept. PK 4809 Firestone Blvd., South Gate, California

921 Pitner Ave., Evanston, Ill. • 360 Carnegie Ave., Kenilworth, N.J. • 111 Colgate, Buffalo, N.Y. • 2404 Dennis St., Jacksonville, Fla. • 6530 Supply Row, Houston, Tex.

Check 1538 opposite last page.

AMERCOAT PRODUC SERVICES ARE AVAIL IN ALL MAJOR CITIES IN EVERY SECTION O UNITED STATES AND CANADA, AND MAN COUNTRIES IN EURO AND SOUTH AMERIC

UNITED STATES:

ALABAMA	Mob
ARIZONA	Pho
CALIFORNIA	Los
	Oak
COLORADO	Den
CONNECTICUT	Wat
FLORIDA	Jack
GEORGIA	Mac
HAWAII	Hon
INDIANA	Ind
ILLINOIS	Chi
IOWA	Des
	Dav
KENTUCKY	Lou
LOUISIANA	Lak
	New
MARYLAND	Bal
MASSACHUSETTS	Bos
MICHIGAN	Det
MINNESOTA	Min
MISSOURI	St.
	Kan
NEW JERSEY	Ken
NEW YORK	Buf
	New
NO. CAROLINA	Cha
OHIO	Cin
	Cle
	Ste
OKLAHOMA	Tul
OREGON	Por
PENNSYLVANIA	Phi
	Pitt
TENNESSEE	Cha
	Kno
	Nas
	Mem
TEXAS	Cor
	Bea
	Hou
UTAH	Sal
WASHINGTON	Sea
WISCONSIN	Mil
	Gre
PUERTO RICO	Hat

FOREIGN:

AUSTRALIA	Syd
BELGIUM	Bru
CANADA	Mon
	Van
CUBA	Hav
DENMARK	Cop
FINLAND	Hel
FRANCE	Par
GREECE	Ath
HOLLAND	Ein
ITALY	Pal
JAPAN	Yok
LUXEMBOURG	
MEXICO	Mex
PERU	Lim
SWEDEN	Sto
SWITZERLAND	Zur
UNION OF SOUTH AFRICA	Joh
VENEZUELA	Car
	Mar
WEST GERMANY	Ham

NOV
60
XUM